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ABSTRACT

The study was designed to increase 88 teacher trainees' generation of inferring and problem solving questions and elicitation of appropriate responses from educationally handicapped students. Teacher trainees participated in one of five groups: (1) anticipating videotapes, (2) coding videotapes, (3) anticipating written version, (4) coding written version, and (5) the control group. The four experimental groups received a training manual designed to teach discrimination of questions and responses. Results indicated the training manual's discrimination training was effective in modifying trainee's generation of questions. It was hypothesized that written materials would be superior to videotape and that anticipation would be superior to coding. Neither hypothesis was supported. Contrary to the latter hypothesis, the results suggested that in some cases coding may be more effective than anticipation. Implications for further research included the need to validate training materials at more than one location and the importance of attending to the quality of students' responses. (Appendixes, which make up half the document, include an evaluation of modules designed to modify teachers' questioning of special education students, illustrations of the four training modules, and a copy of the training manual.) (Author/SBH)

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THE EFFECTS OF ANTICIPATING OR CODING VIDEOTAPED AND WRITTEN MATERIALS ON DEVELOPING THE QUESTIONING SKILLS OF SPECIAL EDUCATION TEACHER TRAINEES[1]

Karen N. Greenough

January, 1976

Final Report 35.3

Center for Innovation in Teaching the Handicapped

Indiana University

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The Effects of Anticipating or Coding Videotaped and Written Materials on Developing the Questioning Skills of Special Education Teacher Trainees

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Abstract

The purpose of the study was to increase teacher trainees' generation of inferring and problem-solving questions and elicitation of appropriate responses from educationally handicapped pupils. The effectiveness of training activities and media of presentation was evaluated at two universities. Teacher trainees participated in one of five groups: (1) anticipating videotapes, (2) coding videotapes, (3) anticipating written version, (4) coding written version, or (5) the control group. The four experimental groups received a training manual designed to teach discrimination of questions and responses. The results indicated the training manual's discrimination training was very effective in modifying trainees' generation of questions. It was hypothesized that written materials would be superior to videotape and anticipation superior to coding. Neither hypothesis was supported. Contrary to the latter hypothesis, the results suggested that in some cases coding may be more effective than anticipation. Implications for further research included the need to validate training materials at more than one location and the importance of attending to the quality of pupils' responses.

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CHAPTER I

INTRODUCTION

Teacher competency in questioning pupils with educational handicaps is the main concern of the present investigation. The objective of this study is to develop an efficient method of preparing special education teacher trainees to ask high cognitive-level questions and obtain appropriate responses to such questions.

Training in which teachers master at a specific level competencies that promote pupil growth has collectively been referred to as competency or performance-based teacher education (PBTE). PBTE reflects a widespread movement toward accountability in education (Gage & Winne, 1975; Semmel, Morrissey, & Semmel, in preparation). The demand for teacher accountability stipulates that teachers should be held responsible for their pupils' attainment of educational objectives. In turn, teacher training institutions are being asked whether or not they train teachers in specific knowledge, behaviors, or skills relevant to teacher-pupil interaction (Semmel, Morrissey, & Semmel, in preparation). Although PBTE does not designate a particular method by which teachers should be trained, the traditional lecture approach fails to meet the requirements of PBTE (Gage & Winne, 1975). For example, the lecture approach typically excludes trainee performance of interactive behaviors as a criterion measure of trainee achievement. Alternative techniques consistent with PBTE directives are currently being developed. However, many of these methods have not yet been evaluated with regard to their effectiveness in training teachers (Gage & Winne, 1975).

Semmel, Morrissey, and Semmel (in preparation) have noted that performance-based teacher education has received less attention from special educators than from general educators. In an earlier review of special education research, Guskin and Spicker (1968) called attention to the paucity of research on teachers' instructional behaviors. With the advent of PBTE, the emphasis of research has shifted from the study of teacher personality and other input variables to investigations that deal directly with the teaching process (Hyman, 1968). In addition, the increased use of observation systems to analyze teacher-pupil classroom interaction has contributed greatly to the study of teacher behaviors (Medley & Mitzel, 1963; Rosenshine & Furst, 1973). Observation systems also have proven useful in teaching both regular and special education trainees specific interactive skills which can then be measured (Flanders, 1962; Rosenshine & Furst, 1973; Semmel, 1974).

In the present investigation, a simple interactive analysis system provides definitions for (a) specific types of behaviors trainees are taught to produce, (b) activities by which trainees learn how to enact the behaviors, and (c) a system for counting behaviors to test trainee level of performance. These training activities incorporate the three training tasks of discrimination, generation, and evaluation (see Figure 1) included in a model formulated by Semmel (1975). Teacher trainees who learn to discriminate between categories of teacher behavior have a basis for learning to generate behaviors appropriate to

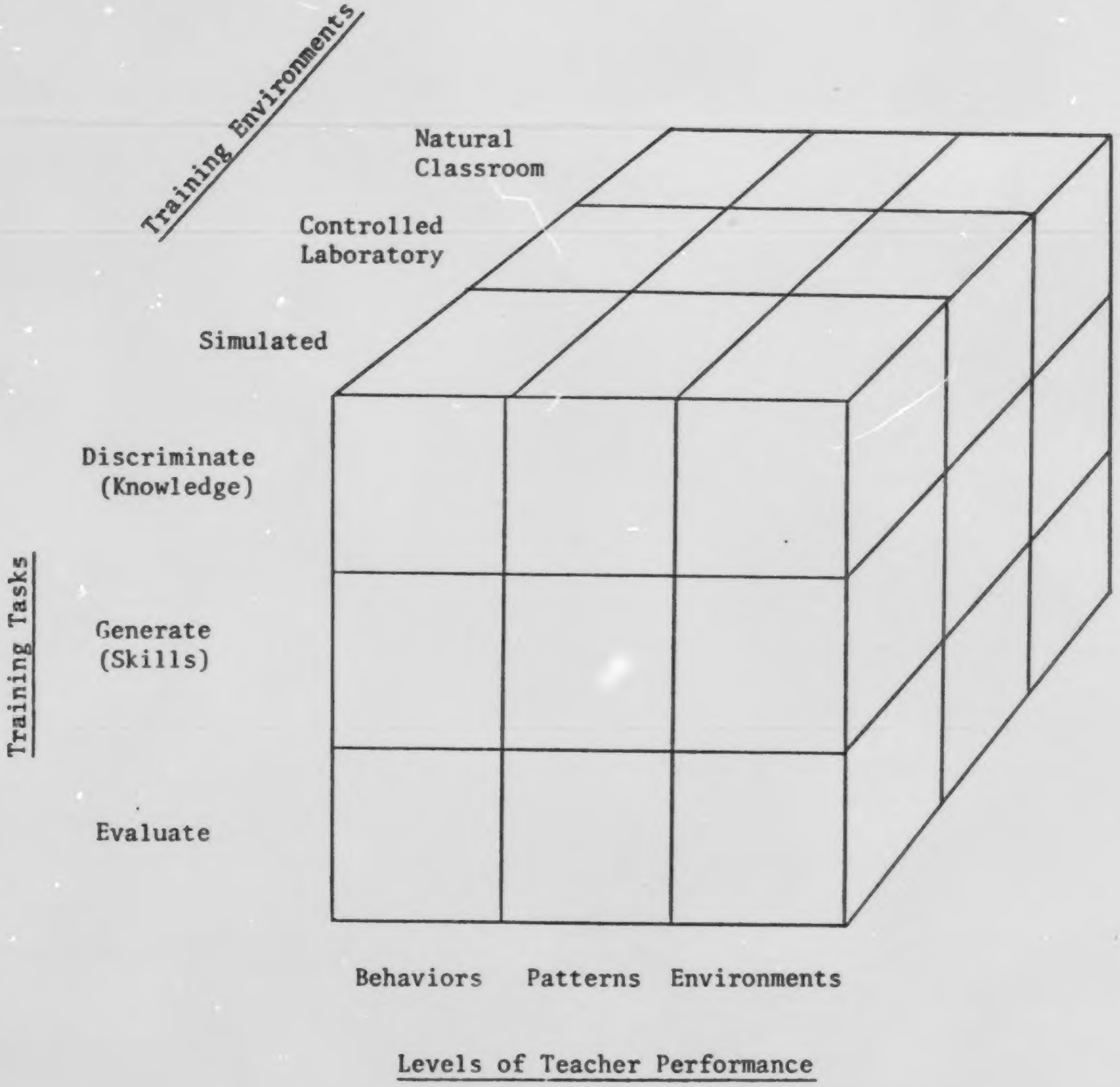

Figure 1: A Model for Preservice Training of Teachers (From "Application of Systematic Classroom Observation to the Study and Modification of Pupil-Teacher Interactions in Special Education" by Melvyn I. Semmel, in Richard A. Weinberg and Frank H. Wood (Eds.), Observation of Pupils and Teachers in Mainstream and Special Education Settings: Alternative Strategies, Leadership Training Institute/Special Education, University of Minnesota, 1975, 231-264.)

certain types of teaching situations. Teacher trainees who learn to discriminate between types of pupil responses have a basis for evaluating the effects of particular teaching behaviors. The three training tasks theoretically can build from individual behaviors, to patterns, to environments which are discriminated, generated, and evaluated. The model also defines three contexts in which teacher training can occur: a simulated environment, a controlled situation, or a natural classroom setting.

Semmel's teacher training model stemmed, in part, from Hunt's (1966) description of the components of teacher effectiveness. One component implicit in Semmel's model and emphasized by Hunt as crucial to teacher effectiveness is flexibility. Flexibility implies a repertoire of behaviors from which the teacher can choose during the interactive process of instruction. A flexible teacher who can discriminate, generate, and evaluate teaching behaviors, will, it is assumed, be more adept at individualizing instruction. Individualized instruction is one of the inherent objectives of performance-based teacher education (Morrissey & Semmel, 1975), as well as a rationale for limiting the size of special classes (Lynch & Ames, 1971a).

Questioning

Classroom instruction can be individualized through the questions teachers ask their pupils. Apparently, teachers employ questions as one of their most frequently used modes of instruction. Teachers in elementary classrooms consume approximately 80% of instructional time asking questions and receiving answers (Floyd, 1960; Moyer, 1966;

Schrieber, 1967; Stevens, 1912). Numerous observation systems have been devised to categorize teachers' questions. The different labels and definitions of question categories make the comparison of systems a complex endeavor. In addition, the systems differ in their classification of questions because coders must infer what cognitive activity is demanded by the question. Nevertheless, one finding remains constant throughout the investigations of questions in classrooms: Teachers' questions emphasize the recall of facts (Gall, 1970). This finding has been replicated in investigations of questioning in special classes (Lynch & Ames, 1970, 1971a; Minskoff, 1967). Reliance on recall-type questions suggests that teachers have a limited repertoire of questioning behaviors.

Although one study indicated that special education teachers do not use questions to individualize instruction (Lynch & Ames, 1970), other studies have indicated that questions are asked so that they differentiate among pupils (Brophy & Good, 1974; Lynch & Ames, 1972a; Minskoff, 1967). These latter studies suggest that teacher's questioning behaviors reflect their expectations of pupils. If teachers underestimate the abilities of pupils in special education (Semmel, Garrett, Semmel, & Wilcove, 1973) and question on the basis of their expectations, then teachers may very well limit the learning opportunities of many pupils.

Modifying Teachers' Questioning Skills

Microteaching, minicourses, and a computer-assisted teacher training system (CATTS) have been used successfully to change teachers' questioning behavior (Allen & Ryan, 1969; Borg, Kelly, Langer, & Gall, 1970; Semmel, 1975; Snow, 1969). Unfortunately, each of these procedures entails expense and equipment beyond the resources of many teacher training institutions. Another limitation of instruction in questioning behavior has been that quality of pupil response has been ignored except in work by Taba, Levine, and Elzey (1964). For these reasons, an efficient module which trains teachers to produce non-recall questions and to use the quality of pupil responses as feedback is sought as an end-product of this study.

Self-contained training modules which provide a defined set of objectives for trainees to attain specific knowledge, attitudes, and/or skills have the potential for meeting the requirements of PBTE (Thiagarajan, Semmel, & Semmel, 1974). Semmel (1975) has argued that such modules may be particularly promising approaches to developing specific, non-interactive teaching competencies (e.g., assessment of pupil ability level), but that relatively few programs exist to assess and develop interactive skills (e.g., teacher questioning). Of the many teacher training products available, only a small percentage [illegible] report evaluation data of any sort (Gage & Winne, 1975).

When producing instructional modules, a decision must be made regarding the medium by which the instructional material will be presented. Microteaching has greatly contributed to the popularity of videotape for teacher training (Snow, 1969). Because videotapes entail considerably more expense than written materials, the cost effectiveness of each medium needs to be determined (Berliner & Codori, 1973; Gall, Dunning, Banks, & Galassi, 1972).

An issue closely related to the medium of presentation is that of learner involvement with the material. In general, the literature on modeling indicates that active learner participation with the material being presented increases the learning of the modeled behaviors (Michael & Maccoby, 1961; Sheffield & Maccoby, 1961). Two types of activities, coding and anticipation, may increase learner involvement with instructional material and hence increase skill in questioning. Coding teacher-pupil interaction has repeatedly been employed as a successful training activity (Peck & Tucker, 1973). Anticipation involves predicting the behaviors of both teachers and children by attending to past behaviors and sequences of behaviors (Baum, 1973; Semmel, Garrett, Semmel, & Wilcove, 1973). Both anticipation and coding may be effective activities for centering the trainee's attention on relevant interactive teaching skills.

Purposes of the Study

The primary purpose of this study is to develop and test instructional modules for modifying the questioning skills of special education teacher trainees. Four modules are compared to determine the most efficient medium and activity for meeting these instructional objectives. The two activities being compared are anticipating and coding teacher-pupil dialogue. The two media being compared are videotaped teacher-pupil dialogue and a written transcript based on the videotaped dialogue. The questioning skills to be taught are the increased use of non-recall questions, e.g., inferring and problem solving, and the elicitation of appropriate pupil responses to the teachers' questions.

CHAPTER II

REVIEW OF THE LITERATURE

The previous chapter presented the need for training modules designed to modify special education teacher trainees' questioning behaviors. This chapter reviews the literature relevant to the major issues addressed by this investigation. The focus is first on the literature concerned with teachers' questions and pupils' responses, and then on the relative effectiveness of different instructional media and cueing activities.

Performance-Based Teacher Education

Performance-based teacher education (PBTE) refers to the growing emphasis on training teachers in specific knowledge, skills, and behaviors which relate to pupil achievement and which can be measured for mastery (Elam, 1971; Gage & Winne, 1975). The teacher trainee is evaluated on her/his ability to reach pre-defined behavioral goals. In addition to these elements which are, by definition, components of PBTE, Elam (1971) lists as implied characteristics individualization, feedback, systematic program, modularization, and accountability. These characteristics are closely associated with the search for alternatives to traditional teacher training programs. Microteaching, self-instructional programs, and videotape or computer feedback represent alternatives which have been used to teach teachers specific skills.

Promotion of pupil learning is the ideal criterion for assessing which teacher skills should be taught. Yet few consistent relationships between teacher performance and student learning have been reported (Dunkin & Biddle, 1974; Rosenshine, 1974). The competencies being taught tend to be based on hypothesized relationships with pupil achievement (Dunkin & Biddle, 1974; Elam, 1971; Gage & Winne, 1974; Peck & Tucker, 1973; Rosenshine, 1974).

In a review of issues related to PBTE, Shores, Cegelka, and Nelson (1973) discussed the fact that few special education programs have provided competency statements to verify their claim of being a performance-based program. All of the published competency statements they found were based on expert opinion rather than empirical evidence. Concerning the issues of process variables in special education, Shores et al. concluded that little is known of the effects of teacher behavior on handicapped children's achievement. In addition, it appears that few PBTE programs train teachers in skills intended for use with educationally handicapped pupils (Semmel, Morrissey, & Semmel, in preparation).

Observation Systems

Originally, classroom observation systems were devised for the study of teachers' behaviors (see Medley & Mitzel, 1963; Rosenshine & Furst, 1973). Semmel (1974) pointed out that the use of systematic observation systems to study the classroom interactive process is especially relevant to special education. Special education has functioned as a repository for a diversity of pupil learning and behavior problems. Special class teachers supposedly receive special training so that they can meet their handicapped pupils' instructional needs. Research has not demonstrated superior pupil growth for those placed in special education. This finding has raised the question of whether or not teacher-pupil instructional interactions in special classrooms differ from those in regular education. Observation systems have been used to learn how regular and special class teachers handle the learning and behavior problems of children (Kaufman, Semmel, & Agard, 1973).

Many observation systems have been revised and others developed to train teachers to perform specific behaviors (Medley & Mitzel, 1963; Rosenshine & Furst, 1973). This use of the systems is discussed further later in this chapter.

In a discussion of observation systems and the special education teacher, Semmel (1974, in press) presented a model which incorporates the training attributes of observation systems (Figure 1, p. 3). The model suggests ways of applying the behavioral categories of interactive observation systems to the problem of developing alternative teacher training programs within the framework of PBTE. For example, the three training tasks defined by the model--discriminate, generate, and evaluate--involve the teacher trainees' use of categories from an observational system. After teacher trainees learn to discriminate among teacher behaviors and among pupil behaviors, they learn to generate the specified behaviors. Teachers may then use the discriminated pupil responses to evaluate their own preceding behavior. Thus, the pupil's behavior can be utilized as feedback for the teacher. This feedback can be used to determine which category of behavior the teacher wishes to generate next. Theoretically, these three training tasks may occur at the level of individual behaviors, patterns, or environments. Instruction can take place in a simulated, controlled, or natural teaching situation.

The teacher training model formulated by Semmel (1975) developed from Hunt's (1966) description of three types of skills that are essential components of a teacher's effectiveness: (1) flexibility, (2) radiating environments, and (3) discrimination. In Hunt's terminology, a skilled teacher is one who has the "capacity to radiate a wide variety of environments, to select from this variety a specific environment to be radiated toward a particular person or group with the aim of producing a particular behavioral outcome, and to shift from one environment to another under appropriate circumstances" (p. 138). If a teacher is to be flexible, then s/he must have a repertoire of behaviors from which to choose. In order for a teacher to match her/his behavior to the needs of the pupil, the teacher must be able to discriminate between possible teacher behaviors, to discriminate between pupil responses, and to generate the teacher behavior based on an evaluation of the pupil's response. It would appear that teachers who have a repertoire of interactive instructional skills are more adept at individualizing instruction. Performance-based teacher education implies individualized instruction (Morrissey & Semmel, 1975) and individualized instruction has been the rationale for limiting the number of students in special classes (Lynch & Ames, 1971a).

Individualization of instruction forces teachers to make decisions during instruction concerning each pupil, a seemingly impossible task in light of the number of variables to be considered. Yet these teacher decisions, according to Morine (1975), are the links that unite classroom events. In a discussion of integrative decision making versus "missing links," she stressed pupil feedback as a necessary ingredient of teacher decision making. She proposed three basic techniques for training teachers in decision making: comparing alternative procedures, adapting procedures to pupil differences, and noticing interactive decisions (Morine, 1975). The comparison of alternative procedures is reminiscent of the discrimination of possible teacher behaviors in both the model developed by Semmel (1975) and the model developed by Hunt (1966). The teacher's ability to adapt to pupil differences is especially important when instructing the heterogeneous group of children who fall within the domain of special education. According to Shavelson (1973), the teacher should be taught both how to perform specific behaviors and how to decide when to perform the behaviors. The process of using pupil behavior as feedback to choose the ensuing behavior should make the teacher more effective in matching her/his behavior to the particular pupil's needs.

Training Modules

The PBTE approach suggests alternative procedures for the instruction of specific behaviors and for making choices among behaviors. An alternative suggested by Thiagarajan, Semmel, and Semmel (1974) is the self-contained module which provides a defined set of objectives for trainees to attain specific knowledge and skills. Elam (1971) defined a module as "a set of learning activities...intended to facilitate the student's acquisition and demonstration of a particular competency" (p. 9). Among the positive features of modules is the potential for self-pacing, individualization, personalization, and independent study (Elam, 1971).

Effective, less expensive methods of helping trainees acquire teaching skills are needed (Gage & Winne, 1975). The self-instructional aspect of modules can translate into money saved in terms of instructional personnel's time spent. According to Semmel (1975), relatively few modules exist to train and evaluate interactive skills such as teacher questioning. Although modules and other teacher training products are available, few of these materials supply evaluation information. One exception is the three year follow-up on a minicourse which demonstrated the longevity of effects of training in a specific set of behaviors (Borg, 1972).

In summary, teacher training in special education needs performance-based teacher education programs to teach the special skills required when individualizing instruction of the educationally handicapped. The application of PBTE to special education teacher training would entail assessment of the degree to which specific skills in teaching the handicapped have been obtained. Skill attainment is judged in terms of the teacher's being able to generate specific behaviors and sequence her/his behaviors in accord with the pupils' behaviors to maximize pupil growth. Traditional methods of teacher training have not met the requirements of PBTE. Training modules have been suggested as viable alternatives especially well-suited to the instruction of specific skills and the assessment of skill mastery.

Questioning

One of the central tenets of special education for pupils with mild educational handicaps has been the pupil's need for individualized instruction. The implementation of individualized instruction has been urged by teacher trainers and textbook authors for handicapped pupils placed in regular or special classes. In fact, one raison d'etre of special classes has been that it is easier to individualize instruction in the smaller special classes.

An obvious way in which teachers can individualize instruction is by varying their questions as they interact with different pupils. Ashner (1961) referred to the teacher as "a professional question maker" and stated that asking questions is "one of the basic ways by which the teacher stimulates student thinking and learning." Evidence of teachers' reliance on questioning goes as far back as Stevens who, in 1912, estimated that question-and-answer recitation consumed 80% of the time teachers and pupils spend in the classroom. Floyd (1960, Moyer (1966), and Schrieber (1967) reported high frequency of teacher questions in elementary schools fifty years after Stevens conducted her research. Similar percentages have been reported for high schools (Davis & Tinsley, 1967; Gallagher, 1965). These high frequencies represent questions verbally presented by teachers to their pupils.

Question Categories

Teachers ask questions for a variety of reasons (Crump, 1969; Lynch & Hillman, 1972; Pate & Bremer, 1967). Most researchers divide questions according to whether their purpose seems to be procedural or instructional. Instructional questions are then categorized according to a cognitive hierarchy. These systems for categorizing instructional questions typically have been designed to assist the researcher in tabulating questions asked in the classrooms. Theoretical orientations leading to the conceptualization of a cognitive hierarchy of instructional questions have been provided by Guilford's "structure of intellect" (1956) and Bloom's Taxonomy of Educational Objectives (1956). Currently popular interaction analysis systems are based on both the theoretical cognitive hierarchy and classroom observations of teacher and pupil behavior. The systems differ according to the content areas for which their use is intended and the degree to which the systems have developed from a theoretical or an empirical basis (Rosenshine & Furst, 1973). The different definitions of question categories make comparisons of the systems a complex endeavor. Gall (1970) compared eight systems under the classifications of recall, analytic thinking, creative thinking, evaluative thinking, and other. Half of the systems had categories which could be included in each of Gall's classifications, and all contained recall-type categories. Gall's classifications are similar to Guilford's operations: cognition, memory, divergent thinking, convergent thinking, and evaluation.

Gall (1970) claimed that most question analysis systems consist of categories based on the type of cognitive process required to answer the questions. This cognitive-process approach results in the coder's inferring rather than observing what cognitive activity must transpire for the question to be answered. Often the coder must decide whether a response must merely be recalled or be worked out by a pupil. Because the coders must infer the cognitive activity the teacher wants from the pupil, the operational definitions of the question categories are decided by the coder's use of cues which are usually not stipulated in the written definitions of the question categories.

Nevertheless, the one finding which remains constant throughout investigations of questions asked in the classroom is that teachers' questions emphasize the recall of facts. Stevens' (1912) study of high school classes revealed that two-thirds of all teacher questions merely called for the direct recall of textbook information. Gall (1970) summarized many studies since Stevens' which also tabulated the frequencies of different types of questions. These studies revealed that recall questions accounted for about 50% to 80% of the questions asked in classes ranging from regular elementary to gifted high school. Since Stevens' study, no significant change appears to have occurred in the types of questions teachers ask. In a more recent classroom study of questioning, Crawford, King, Brophy, and Evertson (1975) reported frequency distributions that revealed a preponderance of "fact related" questions. Gall (1970) concluded that about 50% of teachers' questions require students to recall facts, about 20% require students to think, and the remaining 20% are procedural.

Questions asked in special classes. A limited number of investigations have been conducted on teacher questioning in special education. Typically, the pupils in the classes studied have been labeled educable mentally retarded (EMR).

The proportion of recall (or low level) questions to high level questions appears to be the same or higher for special education classes compared to regular classes (Lynch & Ames, 1970, 1971a; Minskoff, 1967).

Minskoff (1967) investigated teacher-pupil verbal interaction in special classes with emphasis on how to promote productive thinking by EMR pupils. She also compared the interactions of teachers trained in a productive thinking method with teachers who did not receive such training. The third aspect of her study dealt with the relationship between teacher and pupil background characteristics and their verbal interchanges. Seventeen primary and intermediate special class teachers and their pupils comprised the subjects of the study. Nine of the teachers previously had received training and supervision in the implementation of an experimental curriculum and the inductive teaching method (Goldstein, 1963). Analysis of the tape-recorded teacher-pupil dialogue during the second year of the research program yielded the following distribution of the teachers' questions: 88% cognitive-memory, 4% convergent, 3% divergent, and 5% evaluative thinking (Gallagher-Ashner Classification System as reported in Minskoff, 1967). Among the 17 teachers, the cognitive-memory category ranged from 71% to 97% of all questions asked. A comparison of these data with those presented above suggests that an even higher ratio of recall questions is asked in special classes for EMR pupils than in regular classes.

Lynch and Ames (1970, 1971a) conducted an exploratory investigation of individual differences and individualization of instruction in urban intermediate special classes. The study provided information on 10 teachers' questioning behavior from systematic observations throughout a school year. Teacher-pupil instructional interactions were categorized according to the Individual Cognitive Demand Schedule (ICDS) which had been previously developed and tested by Lynch and Ames (1971b). In addition, teachers were interviewed and completed questionnaires concerning their perceptions of their pupils and their instructional procedures. Pupil data were also collected. In their analysis of the teacher-pupil dialogue, low level questions accounted for 59% to 89% of the total interchanges with the average teacher asking approximately 73% low level questions.

The observation data further indicated that teachers vary widely in the amount of time devoted to instruction, the rate of interchanges per hour of instruction, their distribution of questions among students, their pattern of involving pupils in varied levels of questions, and their feedback to pupils. The rate at which questions were asked also varied greatly among the teachers. Even with this difference, the authors noted that "the rates of instructional interaction in this observation sample were all lower than rates found in other studies of elementary classes" (Lynch & Ames, 1970, p. 17). This finding conflicts with the notion that smaller special classes allow greater individualization of instruction through increased teacher interaction with each pupil. Lynch and Ames concluded from the extensive data that "the patterns of teacher behavior toward individuals...are not accounted for by pupil WISC IQ, self-concept and sociometric measures, or by several measures of teachers' perceptions of and attitudes toward their pupils" (1971a, p. 24). Minskoff (1967) also sought evidence of a relationship between teachers' questioning behaviors and pupils' CA, MA, or IQ. She concluded that these pupil characteristics influence the teacher only in terms of the positive reinforcement s/he provided. Lynch and Ames speculated as to whether the differential questioning of the pupils represents deliberate adjustments to the pupils' needs and abilities. Having no evidence that this is what teachers are doing, the authors suspected instead that "these different patterns reflect a complex of situational and reinforcement variables in the teacher's history of learning to survive in the classroom" (Lynch & Ames, 1971a, p. 25). Thus, it appears that teachers ask mostly recall questions and are not using questions to individualize instruction to meet the needs of pupils in special education.

Questions during reading instruction. Evidently, teachers rely very heavily on recall questions during reading instruction. In the urban special classes studied by Lynch and Ames, reading, which totaled 42% of all instructional time in the observation sample, contained the lowest levels of cognitive demands (i.e. questions) and the most limited variety. Minskoff's data also indicated that a larger percentage of cognitive-memory questions were asked during language arts than any other curriculum area. Guzak (1967) examined teachers' questions about reading material in second, fourth, and sixth grades with a sample of four teachers and their pupils at each grade level. The average percentage of recognition and recall questions was 70.4. The author evaluated this high percentage by concluding:

> Conceivably, the expenditure of nearly seventy of a hundred questions in the literal comprehension areas may be justified. Unjustifiable, however, is the involvement of these so-called literal comprehension questions with retrieval of the trivial factual makeup of stories. In real life reading situations, readers seldom approach reading with the purpose of trying to commit all the minute facts to memory. Rather, the reader is more interested in getting broad understandings of the material, finding out specific things commensurate with his interest of other needs... Seemingly, if teachers want to get at utilitarian aspects of literal understanding, they would offer many situations...for translational activities wherein they could really determine the extent to which children were understanding the literal elements. (Guszak, 1967, p. 233)

Teachers' preference for recall questions. Why do teachers ask so many recall questions and so few questions which require inferences, evaluations, or other cognitive activities? Possibly, teachers place too much importance on pupils' giving the right answer and therefore find themselves uncomfortable asking more creative questions for which there exist no clearly right or wrong answers (Carner, 1963; Eisner, 1956). Other reasons often given for the high frequency of recall questions are that memory questions are easier to ask and teachers do not know how to word different types of questions (Aschner, 1961; Rogers, 1972; Sanders, 1972; Tinsley, 1973). In fact, there is some evidence that teachers do not really understand the cognitive emphasis of the questions they plan (Tinsley, 1968). Recall questions which begin with "why" or "how" especially mislead teachers into believing that they are asking high level questions, even though the expected answer has just been provided by text or lecture (Sanders, 1966).

In conjunction with the assumption of a cognitive hierarchy of question types is the assumption that low level questions (e.g., recognition and recall) are easier to answer than high level questions (e.g., inferring and problem solving). Researchers have frequently suggested that teachers should ask recognition and recall questions to establish an information base and to provide success experiences for their pupils before requiring higher levels of cognitive activity (Lynch & Hillman, 1972; Minskoff, 1974; Taba, Levine, & Elzey, 1964). This suggestion could be misleading: A recall question is not necessarily easier for a pupil to answer than an inferring question. As Sanders explained, "The differences in the questions offered at various grade levels should be the complexity of the thinking, rather than in the kind of thinking" (1966, p. 10). Applying the same point to slow and rapid learners, he claimed there are simple questions in each category of Bloom's taxonomy and that slow children, above all, need a variety of cognitive demands. Rather than restricting slow learners to recall-type questions, Sanders suggested that some of these students will have greater success with questions which provide facts and ask students to use these facts.

The assumption of errorless learning, which also contributes to the dominant role of recall questions, is disputed by Crawford et al. (1975). Although many have thought that learning is optimal when it proceeds errorlessly, Crawford et al. found that the best level for learning is achieved when approximately 75% of all questions are answered correctly. They suggested that some new challenge and a certain amount of failure assist learning. Apparently, the optimal difficulty of the questions varies with the mode of presentation, the developmental level of learner, and the familiarity of the materials (Crawford et al., 1975).

Although possibly unjustified, the high frequency of recall-type questions asked pupils in special education can be understood. It is reasonable to conclude that teachers are not as apt to ask questions which they do not believe their pupils are capable of answering (Minskoff, 1967).

Questions and Expectations

It is not clear how teacher expectation of pupil abilities is related to teacher behavior toward pupils. Although Lynch and Ames were unable to correlate teachers' differential questioning of pupils to pupil characteristics or teachers' perceptions of the pupils in special classes, they did find a correlation between teacher judgment of ability and frequency of interaction with pupils in a study of regular classes (Lynch & Ames, 1972a). Brophy and Good (1970) also reported that teachers display different questioning behaviors. The latter investigators asked the teachers to rank the children in their classes in order from highest to lowest achievers. The instructions to the teachers were purposely vague in hopes that the teachers would then use subjective criteria for the ranking. These rankings were assumed to represent the teachers' expectations. Those children ranked as high and low achievers were observed in four first-grade classrooms. Although the teachers were not informed that specific pupils were being observed, the request to rank their pupils by achievement may have affected the teachers' interaction with high and low achievers. Also, it seems very likely that the coders were aware of which pupils were perceived as high or low achievers. Brophy and Good found that the teachers in this study were more apt to call on the pupils ranked as high achievers. When high achievers were called on, teachers were more likely to give the pupils time to answer. When the children ranked as low achievers failed to provide an answer immediately, the teachers were inclined to call on another pupil. They also found that children perceived as high achievers were praised more for correct responses and received less negative reinforcement for incorrect responses. These results seem to indicate a way in which teachers make sure their pupils will fulfill the teachers' expectations.

Another investigation which suggests teachers do not give "slower" pupils the same opportunity to learn as that provided pupils perceived "brighter" was conducted by Beez (1972). In a semi-laboratory study, graduate education students tutored Head Start children. The tutors received psychological reports which indicated that their pupil either was or was not likely to do well in school and on school-type tests. Sixty children were randomly assigned to a "low ability" or a "high ability" group. At the time of the experiment, only the names and ages of the children were known. The actual IQ's were not known until after the completion of the experiment. The experimenters were not told the pupils' group assignments nor the content of the psychological reports given to the teachers. The tutors were given a long list of functional words and told to teach their pupil to recognize as many words as possible in 10 minutes.

The results of Beez's investigation were both clear and dramatic. Teachers with favorable expectations attempted to teach twice as many words as teachers with unfavorable expecations. In fact, the two distributions for the number of words presented by the teachers had little overlap. The two groups also differed significantly in the number of words learned: approximately six words for the high ability and three words for the low ability group. Further analysis indicated that even when two pupils, one "high ability" and one "low ability," were taught the same number of words, the pupil from the "high ability" group learned more words.

Beez's study was followed by two similar experiments, one by Carter (1969) in which the results were partially replicated and one by Panda and Guskin (1970) in which the results were not replicated. In a review of the research on the causes and consequences of teacher-student relationships, Brophy and Good (1974) suggested that the growing familiarity of preservice and inservice teachers with studies which induce expectations has interfered with attempts to replicate the findings of Beez. The successful replications tend to occur when teachers and pupils do not know each other and when the teachers are not given sufficient time to form their own impressions. Unsuccessful replications are accounted for by Brophy and Good as being a function of weak treatments and/or teachers not accepting the information designed to induce expectations. Regardless of the mixed results reviewed, the authors have stated that expectations do cause some teachers to treat some students in inappropriate ways. Brophy and Good explain the negative effects of expectations as resulting from ones which are inaccurate and inflexible. In such cases, only those characteristics which confirm the expectations are observed and reinforced. Only then are the expectations translated into "self-fulfilling" prophecies.

The possible implications for children labelled educationally handicapped seem clear. Typically, teacher trainers and textbooks emphasize the handicaps, the ways in which such children might be different from children who are succeeding in regular classes. If the tendency of teachers to ask recall questions is combined with teachers' general expectations for performance difficulties of some pupils, the result is limited learning experiences for those already educationally handicapped.

Pupils' Responses

Teacher questions fulfill their instructional purposes only when they elicit responses resulting from the intended cognitive activities. To ensure such responses, a teacher must ask questions which the student has some knowledge of how to answer. Thus, the accuracy of the teacher's expectations determines the suitability of the teacher's questions.

Teachers' Expectations of Pupil Responses

Although the accuracy of educators' expectations of pupils' performance has been investigated in the past, the results have been contradictory. In a summary of this research, Baum (1973) concluded that the accuracy of teachers' predictions vary with the performance areas, the intellectual levels of the pupils, and the teachers' experience with contradictory evidence. He also concluded that individual teachers vary considerably in their prediction accuracy.

Baum stated that there is evidence in the area of reading that teachers can reliably predict pupil behavior and that predictions can lead to increased teacher understanding of the pupils. One investigation indicated that some differences in results are the consequence of the different criterion tests used in the various studies (Finley, 1966). When three standardized tests were compared with teacher ratings, opposing conclusions were indicated depending on which test was considered the criterion. Whether or not a teacher can predict a pupil's behavior better than a test may not be the real issue, considering the importance of a teacher's knowing the functioning level of the pupils. Teachers can not be constantly testing for this information; predictions are needed and made during instruction. Instead, the crucial issue is to determine when teachers are less accurate predictors and how can this skill be improved.

A study reported by Semmel, Garrett, Semmel, and Wilcove (1973) investigated the accuracy of college students' expectations of children considered retarded or nonretarded. The responses of 65 special education pupils and 66 regular class pupils to questions emphasizing cognitive processes had previously been collected. A questionnaire was constructed incorporating 24 of the original 25 questions and 10 of the more frequently given responses to each question. The questionnaire's instructions directed subjects to indicate which answer was most commonly given by children who were retarded and which by children who were not retarded. The questionnaires were completed by undergraduates in educational psychology

(N=83), psychology (N=52), special education (N=59), and graduates in special education (N=96).

The finding of greatest interest was that, across all variables, all subjects anticipated more accurately the responses of nonretarded children than the responses of children designated retarded. Students majoring in special education anticipated more accurately than psychology majors and others for the EMR group and when the two groups of children were pooled. Students in special education anticipated better than those in educational psychology; undergraduates in education anticipated better than undergraduates in psychology. However, no differences were found between the anticipation scores of those in graduate special education and those in undergraduate special education. Anticipation scores for undergraduates improved as the number of course work hours in special education increased, although undergraduates with 7-9 hours performed as poorly as those with zero hours. The results also indicated that females anticipated children's responses more accurately than did males.

On 16 of the questionnaire's 24 items, the response given most frequently was the same for both groups of children. The college students anticipated 13.2 of the 24 items correctly for the nonretarded children's responses and 5.5 of the 24 items correctly for the responses of the EMR group. In their discussion of the results, the authors pointed out that college students, even special education majors, underestimated the abilities of pupils labelled EMR. The special education majors seemed to expect EMR children to perform at a lower cognitive level than their "normal" agemates. The authors noted that, although the college students most familiar with children designated EMR anticipated pupil responses better than other college students, they still anticipated the responses of EMR children at about half their level of accuracy when anticipating the responses of nonretarded children.

Low expectations of children's cognitive abilities may also occur for children labelled emotionally disturbed or learning disabled, but probably not to the same degree as with children labelled mentally retarded. With the identification and labeling of any handicap, however, the abilities of the labelled individuals may be underestimated as a result of the label (Guskin & Guskin, 1970; Wright, 1970).

Pupils' Ability to Respond

Can children designated educable mentally retarded, emotionally disturbed, or learning disabled perform the cognitive processes necessary to answer higher level questions? Sanders (1972) stated that all levels in Bloom's hierarchy of questions have been proven applicable to all grade levels, all scholastic aptitude levels, and all subject fields. According to Sanders, each category contains questions appropriate for slow learners and for the gifted. However, the thought of generating problem-solving questions that can be answered by pupils with a limited functional vocabulary may raise doubts concerning the validity of Sanders' optimism. An inhibited child may be reluctant to infer the thoughts or emotions of others; another child who is asked a problem solving question may in actuality be recalling information. Sanders hinted at these difficulties when he suggested:

> While it is true that there are easy and difficult questions possible in every category of thinking, in practice it frequently turns out that when teachers start asking more higher level questions, they receive more incorrect answers. It is harder to compose questions in higher categories for average and slow students than for bright students. (1972, p. 269)

Major limitations on the abilities of special education pupils to answer questions may be independent of the level of thinking required. Two such limitations might be a restricted vocabulary or an inattentiveness to the task.

Minskoff (1974) described the role of teachers' questions in remediating auditory-verbal learning disabilities. She stressed the necessity of using teacher-pupil verbal interaction to combat low functioning levels in auditory reception, verbal expression, auditory sequential memory, thinking operations, and reading comprehension. Minskoff claimed that many children with visual and auditory disabilities are being trained with visual materials rather than the planned auditory-verbal interactions needed to ameliorate their disabilities. Minskoff's conclusion implied that, even with special education pupils who have specific disabilities limiting their responses, teachers should know how to ask questions that require different kinds of activities and responses from the pupils. Furthermore, Minskoff stated that teachers can determine the nature of pupils' thinking through appropriate questions.

Suppes (1974) reviewed studies of cognition in retarded children. Some of the studies reviewed focused on the language of severely rather than mildly educationally handicapped children. It is interesting to note the consistency with which verbalization rather than concept formation or abstraction was the critical deficiency of those designated retarded. Suppes also reported that the reading difficulties of retarded children reside at the nonmeaningful automatic level rather than at the meaningful level of responding. This finding is a further indication that some inferring or problem-solving questions may be easier for such children to answer than some recall questions. The deficiency in verbal performance again suggests increasing the pupils' opportunities for verbalization.

In summary, it appears that some mildly educationally handicapped children are less capable of responding to questions at all cognitive levels because of low verbal performance levels. Suppes (1974) reported no evidence that other cognitive deficits of the educationally handicapped were interfering with their ability to respond to high level cognitive demands.

Creative thought and special education. Within the heterogeneous classification of children with educational handicaps are those who occasionally offer interesting, varied, and lengthy responses to their teachers' questions. Originality, fluency, flexibility, and elaboration of ideas have been listed as the four facets of productive thinking (Torrance, 1959). Productive thinking can be equated with creativity and divergent thinking. Inferences are a component of productive thinking, and productive thinking is a component of problem solving (see Sanders, 1966). The majority of research on productive thinking has focused on children and adults considered intellectually gifted. A few research projects have compared the productive thinking of special class children with similar IQ regular class pupils and/or higher IQ regular class pupils.

Tisdall (1962) investigated productive thinking by testing elementary EMR children who had been randomly placed in either special or regular classes as part of a larger study (Goldstein, 1963). An equal number of children lived in urban and rural areas. The normal subjects attended the same schools as the EMR subjects. Productive thinking was assessed by tests devised by Torrance, Schenetzki, Palamutler, and Luther (1960). Tisdall interpreted the results as indicating that placement in special classes seemed to enhance the ability of children labeled EMR to think productively. He also found that the verbal productive thinking scores of the urban special class children were not significantly different from those of same-age children with higher IQ's.

Encouraged by Tisdall's findings, Rouse (1965) designed 30 lessons to enhance productive thinking by high school special class students. Most of the lessons involved brainstorming solutions to problems. A verbal task and a nonverbal task from the Minnesota Tests of Creative Thinking were employed as pre- and posttests. For six weeks, five teachers of special classes presented the lessons to their students. Five other special classes received only the pre- and posttests. The group that received training in productive thinking demonstrate significant gains on both the verbal and nonverbal tasks. Based on these results, Rouse advocated giving special class students the opportunity to practice productive thinking and warned against leaving productive thinking to chance and incidental learning. Unfortunately, a comparison of Rouse's findings with those of an investigation by Smith (1967) indicated that the scores obtained by the children after the lessons were similar to scores obtained by normal children who were two years younger (Spicker, 1967). When Smith found normal children significantly exceeded their matched EMR counterparts on verbal creativity factors, he postulated that the selection factor was responsible. Once again, the low verbal performance of those labelled retarded differentiates these children from their agemates.

Although the productive thinking scores of some children may not reach those of other children, the demonstration that, given the opportunity, children with educational handicaps can become more skilled in higher level thought processes is of great importance. It is important that handicapped children learn to do more than recall the facts they are taught. Bloom (1956) differentiated between remembering and "understanding" or "insight." He explained that the phrases to "really know" or "true knowledge" implicitly assume that knowledge is of little value if it cannot be utilized in a form very different from its first context. He argued the importance of intellectual skills and abilities as necessary for making decisions and solving problems in our rapidly changing and unpredictable culture. Although educators may agree with Bloom, the question remains as to whether or not such intellectual abilities and knowledge are learned from answering high level cognitive demands.

Questioning and Pupil Achievement

The relationship between the types of questions asked during instruction and increase in the pupil's knowledge and cognitive skills remains unclear. One investigation identified, through classroom observations, 20 junior high school science teachers who asked high level questions (Ladd & Anderson, 1970). A test composed of high and low level questions resulted in much better scores by the students who had previously answered high level questions.

Hunkins (1969) asked whether a dominant use of analysis and evaluation questions in sixth grader social studies materials would improve the achievement of students in different levels of cognitive activity. While 127 pupils worked with materials which emphasized analysis and evaluation questions, 133 pupils worked with materials which primarily utilized knowledge questions. The achievement test administered after the four weeks of treatment provided six subscores, one for each level of Bloom's Taxonomy. The results indicated that the use of high level questions did improve pupils' ability to evaluate information. The author also stated that the high level questions did as well as low level or knowledge questions in increasing pupils' knowledge achievement. Because of some weaknesses in Hunkin's research design, Gall (1970) viewed the above finding as only suggestive.

Winne (1975) outlined and commented on 12 studies of questioning and student achievement. He concluded that nine of these studies probably were not valid evaluations of the influence of teachers' questions on student learning. He judged three studies to be relatively methodologically sound (Buggey, 1971; Savage, 1972; Tyler, 1971). Buggey's study indicated that higher cognitive questions led to greater achievement than did lower cognitive questions for second graders. Savage failed to replicate the results in a study which used the same instructional materials with fifth graders. Failure to replicate may have been a result of using the materials inappropriate for the grade level. The study of second graders by Tyler (1971) found that questions asked by teachers were more effective than questions presented by text.

Two experiments conducted by Lynch, Ames, Barger, Frazer, Hillman, and Wisehart (1973) compared the effects on pupil learning of induced orientations toward lesson objectives. One group was told that the objective was pupil recall, while the other group was told to teach for concept mastery. Although this research has been criticized on methodological grounds (Winne, 1975), analysis of the teaching behaviors indicated that the teachers' questions were congruent with their assigned objective. Both studies found pupils in the recall treatment did better on the recall test, but no differences were found on the concept mastery test. In the discussion, the authors questioned the reliability of the concept mastery criterion test and the degree to which the concept mastery teachers used the requisite number of higher level cognitive demands during their instruction.

Until more consistent, sound evidence of student achievement as a function of teachers' questions is available, no definitive statements can be made concerning how teachers should question to ensure learning. Hillman (1971) stated that there is insufficient evidence that pupils' learning is affected by the level of question asked. Consequently, he concluded that training teachers to ask high level questions is not warranted. On the other hand, Ladas and Osti (1973) maintain that:

> From the scholar's viewpoint this is an admirable stance; we should do our homework. However, from the teacher's viewpoint it leaves much to be desired. For there are classes to teach--and they must be taught now. (p. 1)

Therefore, instruction in questioning continues to be provided for teachers based on the theory that cognitive skills are learned in response to cognitive demands.

Changing Teachers Questioning

Most of the research on modifying teachers' questioning behavior has ignored one of the most important criteria of successful questioning--the pupil's response. In an exploratory study of the thinking abilities of children, Taba, Levine, and Elzey (1964) recognized pupils' responses as a critical source of information for the teacher. Teachers were instructed to use the pupils' responses to determine if pupils were ready for higher level questions. Taba et al. attempted to identify questioning strategies which could stimulate children to reflect on curriculum materials on an increasingly abstract level. The researchers suggested that perhaps the most startling among the numerous findings was the low relationship between level of thinking and any traditionally influential variables such as intelligence, reading comprehension, or social status. In fact, two children, one considerably above and one considerably below average IQ, were performing on high thought levels and with the same frequency. Although results were not consistent among all experimental classes, Taba et al. found that the students of teachers who had been trained, as compared to those with untrained teachers, were better in their ability to discriminate, to infer, and to apply what was known to new problems. She also found that teachers were relatively successful in getting the response sought. Other studies in various curriculum areas have demonstrated that teachers can be taught to increase their repertoire of types of questions asked (Clegg, 1969; Konetski, 1970; Rogers, 1972). Konetski found that having teachers classify or write questions increased their use of higher level questions. The subjects and instructors preferred the method of designing questions for problem solving over that of classifying questions. Rogers reported a tendency for student teachers to compose more varied questions after playing an instructional game called Questioneze. Unfortunately, no control group was included to show that gains were not a result of the pretest.

Much of the success in modifying teachers' questioning behaviors has been obtained through the use of microteaching and minicourses (Allen & Ryan, 1969; Borg, 1972; Peck & Tucker, 1973; Snow, 1969). This approach to teacher training is discussed more fully below.

Changing Special Education Teachers' Questioning

Very few studies have attempted to change teachers' questioning behavior in the context of special education. Minskoff (1967) examined the effects of a curriculum designed to train teachers to increase their pupils' productive thinking. Classroom observation data collected one year after the teacher training failed to show that the training program had increased the teachers' use of high level questions. In fact, the teachers who received no special training asked slightly more productive thinking questions than the teachers who received training and supervision. Minskoff suggested that the teachers' attitudes may have been responsible for their not asking higher level questions: Most of the teachers held limited educational goals for their students and thus possibly did not believe them to be capable of higher levels of thought.

The Computer-Assisted Teacher Training System (CATTS) (Semmel, 1968) and a modified Flanders Interaction Analysis System (Flanders, 1962) were used successfully to increase the frequency of broad questions and reduce the frequency of binary questions asked pupils designated educable mentally retarded (Schmitt, 1969). A positive relationship was found between teachers' use of broad questions and multiple word responses by the pupils.

One of the variables manipulated in an investigation by Hillman (1971) was the type of question asked special class pupils. Either preplanned remembering or inferring questions were asked before or after 10 segments of a tape-recorded short story. The pupils scored highest when the criterion test questions were of the same type as those in the treatment lessons. Although this conclusion seems obvious, it does suggest that research on the effects of different question types on pupil learning must be concerned with the type of questions comprising the criterion measure. Furthermore, it suggests that teachers should consider their objectives in terms of pupil outcomes when deciding what types of questions to ask.

In summary, the preceding discussion suggests specific directions in which teacher training in questioning should proceed. Besides establishing teachers' dependence on questioning as a teaching technique, research in both special and regular education classrooms has clearly identified recall as the cognitive activity typically demanded. The high frequency of recall questions is, in part, a function of certain assumptions. One such assumption is that an information base must precede questions involving more cognitive activity. Another is that pupils must obtain success experiences through the "easier" recall questions. In addition, some researchers conclude that recall questions are easier to ask and that teachers do not realize their questions require only the recall of previously stated information. In contrast to teachers' questioning behavior, teacher educators emphasize the necessity for pupils to be taught to perform such cognitive activities as inferring and problem solving. Although the research is scarce and inconclusive, educational theory proposes that long-term learning and understanding depend on pupils' use of high levels of cognitive activity. Regarding the ability of special education pupils to answer non-recall questions, the literature indicates that verbalization deficits limit pupils' answers rather than their performance in creativity, concept formation, and abstraction. It has been suggested that high level questions can be used to combat deficits in verbal performance. Evidently, even those trained in special education inaccurately predict the performance of educationally handicapped pupils by not giving them sufficient credit for their knowledge and abilities. The ramification of inaccurate expectations can be a limiting of the pupils' opportunities to learn.

Although various experimental investigations have modified teachers' questioning behavior, only one study instructed teachers to attend to the pupils' responses and use the pupils' behavior to evaluate and plan questions. Experimental studies on the modification of teachers' questioning of handicapped pupils are scarce.

The problem, then, entails training teachers of the educationally handicapped to ask questions calling for cognitive activity beyond recall and to attend simultaneously to the appropriateness of the pupils' responses.

Instructional Media and Activities

The development of a variety of instructional techniques and formats has stimulated the application of alternative procedures for training teachers in questioning skills. Many of these procedures fall within the domain of simulation. The common denominator in the assortment of definitions of simulation seems to be the active involvement of individuals with a representation of real-life situations (Baum, 1973; Kersh, 1966; Twelker, 1968). Simulation allows the developer and/or trainer to control many of the variables in the learning environment. Regarding the effectiveness of simulation, Baum (1973) stated that a major problem with the research is the paucity of well-controlled studies using experimental designs. Therefore, he concluded that few statements can be made about the actual effects of simulation. Aspects of simulation which have been studied include cost of simulation, realism, situation simulated, control of feedback, and media of presentation.

A type of simulation termed microteaching has become a popular method for teaching teachers specific skills (Bush & Allen, nd; Orme, 1970; Thiagarajan, 1974). Microteaching usually involves videotaping a teacher who instructs a few students for five or ten minutes. The teacher immediately reviews the lesson with the aid of the videotape and a supervisor, and then replans and reteaches the same lesson to another group of students. The sequence continues for several trials. The specific skill to be learned is often presented on a videotape: the model videotape may be repeated for comparison purposes. Microteaching's use of videotape for modeling is based on research which demonstrates that persons can effectively acquire a complex behavior just by observing someone else perform that behavior and viewing its consequences (Bandura & Walters, 1963).

From the beginning, "asking higher order questions" has been one of the skills successfully taught through microteaching (Allen & Ryan, 1969; Snow, 1969). Peck and Tucker (1973) reviewed an impressive list of studies on microteaching, most of which reported positive results. At worst, microteaching achieved results similar to conventional training programs, but with a savings in time spent and administrative costs (Kallenbach & Gall, 1969).

The microteaching approach to teacher education continues to be adopted and modified by training institutions throughout the country (Manis, 1973; Peck & Tucker, 1973). Manis (1973) examined the effectiveness research on microteaching and suggested that the implementation of this complex program, was a considerable deviation from the ideal. His criticisms included the fact that evaluation is based on the counting of kinds of behaviors produced with no regard for the quality of the behaviors. Nevertheless, microteaching has provided teacher trainers with a viable model for improving the skills of preservice and inservice teachers.

A set of packaged programs called minicourses utilizes the microteaching procedure (Borg, Kelley, Langer, & Gall, 1970). Several of the twenty minicourses developed or being developed instruct teachers in questioning. Minicourse 1, "Effective Questioning in a Classroom Discussion (Elementary)," has been the most extensively researched. A three year follow-up of 24 teachers found that their performance had remained superior to their precourse performance on 8 of the 10 behaviors taught in minicourse 1 (Borg, 1972).

In general, a minicourse package contains a teacher's handbook, instructional films, model films, and a coordinator's handbook. The materials are expensive, which probably limits their diffusion and adoption by teacher training programs. The expense goes beyond the purchase or rental of the materials. Although not essential, the presence of supervisors and/or coordinators is strongly recommended. When used in preservice training, arrangements must be made to have a pool of pupils available so that the teachers can practice their skills. Also, equipment must be present to obtain video or audiotape recordings of all teaching sessions for corrective feedback.

Media of Presentation

Microteaching has intensified the interest in videotapes for teacher training. The assumptions that videotaped instructional materials are appealing and motivating for the learner has contributed to the increased use of videotaped training materials. Because of the expense of purchasing and operating the equipment, the use of videotape needs to be justified in terms of its effectiveness (Berliner & Codori, 1973). One study compared the effectiveness of videotape to a verbal presentation of a modified Flanders Interaction Analysis System (Murray & Fitzgerald, 1973). The student teachers who received the modeling videotape incorporated more of the indirect behaviors; those who received the verbal presentation incorporated more direct behaviors. The authors also concluded that a single exposure to a videotaped model demonstrating a specific set of behaviors appears to be sufficient for behavioral change.

More recent studies comparing videotape instruction to written materials based on the videotapes have obtained results less supportive of the superiority of videotapes. While Koran (1970) found the videotape modeling treatment, on the average, may have been best for increasing teachers' use of analytic questions, the written treatment was best for some types of teachers. He suggested that the more costly videotape is justified for some, but the considerably cheaper printed version may be sufficient for others. In an evaluation of videotape versus transcript instruction in group process concepts, neither videotape nor transcripts were more effective (Berliner & Codori, 1973). Again, there was some evidence that effectiveness of the treatments interacted with characteristics of the subjects.

In the above study and one by Gall, Dunning, Banks, and Galassi (1972), the written versions were based on videotaped interactions modeling the behaviors to be discriminated. Both research teams postulated that when written versions are based on videotapes, the written material is more realistic and therefore more successful than most pencil-and-paper instructional materials. The comparison of the two media by Gall et al. evaluated the effectiveness of a Minicourse on higher cognitive education. The video and written groups outperformed the control group, but the two media groups did not differ significantly from each other in the percentage of higher cognitive questions the subjects asked. The written group performed better than the video group on the number of student responses for both elementary and junior high grades, on the length of student responses for the elementary grades only, and on the number of probing questions for the fourth through sixth grades only. There were no differences in the use of refocusing questions. In sum, the written group performed as well as or better than the video group across all dependent variables.

Because of their original novelty, videotape instructional materials have been excepted to be interesting and motivating for the learner. Games have also been used in teacher training for the same reason. In a comparison of teacher training games and programmed instruction (PI), Garrett and Wilcove (1973) provided special education teacher trainees with information regarding cognitive similarities between educable mentally retarded and nonretarded children. Although both groups learned the materials, the PI group made fewer errors than the game group on the posttest, took less time to complete the learning task, and had more members who could correctly state the generalization on which the learning materials were based. A further indication that the game format does not necessarily provide increased learner motivation was the finding that 15% of the game group subjects intensely disliked the game experience. None of the PI group reported a dislike of their experience. Thus, the novelty of games did not translate into instructional effectiveness by virtue of learner motivation. Levie (1974) proposed that choice of instructional mode by novelty and appearance is dangerous because of its subjectivity.

Further evidence of no difference between media of presentation in terms of instructional effectiveness is provided by numerous media comparison studies (Chu & Schram, 1967; Levie, 1974; Schramm, 1964; Silberman, 1962). The "no difference" position has been expressed by Gagne as follows:

> Most media of communication can readily perform most instructional functions. They can be performed by pictures, by printed language, by auditory language, or by a combination of media. So far as learning is concerned, the medium is not the message. No single medium possesses properties which are uniquely adopted to perform one or a combination of instructional functions. Instead they all perform some of these functions well, and some not so well. (1974, oral presentation)

Yet the different media do have attributes which can determine which one or what combination should be used in the development of training materials for different instructional situations. Table 1

Table 1

Media/Media Attributes

MEDIA

MEDIA ATTRIBUTES

		CAI input/output terminal	Videotape	Super 8- filmloop	16mm film	Overhead transparency	Slide	Filmstrip	Realia	Print	Audio tape (cassette)	Audio tape (reel)
TASK	Audio	/	X		X						X	X
	Visual	X	X	X	X	X	X	X	X	X		
	Motion	/	X	X	X							
	Color		/	X	X	/	X	X	X	/		
	3-Dimensionality								X			
	Realism		X	X	X		/	/	/		/	/
LEARNER	Response Acceptance	X				/				X	/	/
	Feedback	X	/	/	/	/	/	/		X	X	X
	Audio	/	X		X						X	X
	Visual	X	X	X	X	X	X	X	X	X		
	Self-Pacing	X	X	/		/	X	X	X	X	/	/
	Random Access	X	/			X	X	X	X	X		
PRODUCTION	Editability	X	/	/	/	X	X	X	/	X	X	X
	Transportability	/	/	/	/	X	X	X	/	X	X	X
	Simplicity		/			/	X	/		X	X	X
	Low Cost					X	X	/	/	X	X	X
	Short Time Requirement	/				X	X	/		/	X	X
DISTRIBUTION	Editability	X					X			X		/
	Self-Contained	X		X	X	X	X	X	/	X	X	X
	Scheduling Flexibility		X	X	X	X	X	X	X	X	X	X
	General Availability		/		/	X	X	X		X	X	X
	Ease of Use	X		X		X	/	X	X	X	X	/
	Low Cost					/	X	X		X	X	X
	Quick Set-up Time	/		X		X	/	X	X	X	X	X
	No Special Environment	/	X	/		X		/	X	X	X	X
	Grouping Flexibility	/	/	/	/	/	X	X	X	X	X	X
	Compactness Handling/ Storage		/	X	/	/	/	X		/	X	/

X = Is usually present in the medium
/ = Can be obtained, but is not a usual attribute of the medium
= Is usually not associated with the medium

Note. From "Approaches to the selection of media: Theory and practice" by H. D. Stolovitch, Center for Innovation in Teaching the Handicapped, Indiana University, Occasional Paper 8, May, 1975, p. 65.

displays the task, learner, production, and distribution attributes of videotape and print (Stolovitch, 1975). Note that printed materials are credited with more positive attributes than videotape in terms of production and distribution. Media comparisons in teacher education research have considered only a few of the attributes which characterize instructional media. In a sourcebook for developing teacher training materials in the field of special education, Thiagarajan, Semmel, and Semmel (1974) also presented media alternatives and discussed consideration in media selection.

The media attributes table (Table 1) excludes the variable of instructional effectiveness. Mager and Beach (1967) addressed the question of media selection in terms of instructional effectiveness. They suggested the following considerations:

> The first is to choose the media which most closely approximates the conditions in which the learner will be expected to perform... Second, choose a medium which will allow the learner to respond in the manner expected of him in the criterion situation. Finally, choose the medium which will allow the learner to make the largest number of relevant responses in a given period. (p. 8)

When pragmatic limitations do not determine the choice of media, instructive effectiveness should be the selection criterion. If more than one medium meets the practical considerations, materials can be presented by the various media and an evaluation of their relative effectiveness used as the basis of selection.

Instructional Cueing Activity

In the research on videotape versus transcripts (i.e., print medium), verbal interaction among persons modeling the specific behaviors comprise the content of both media. The evidence consistently indicates that complex behaviors can be acquired by seeing the behavior and its consequences (Bandura & Walters, 1963). Research has also indicated that when learners code modeling behaviors into images or words these cue words or images mediate in the retrieval and reproduction of the response (Bandura, 1969; Sheffield & Maccoby, 1961). Merely exposing the learner to the modeled skills does not necessarily mean the learner will attend and provide the mediators for the appropriate behaviors. An activity which prompts or cues the learner to the appropriate behaviors seems to increase the learning. Audience participation has been shown to lead to more successful learning of modeled behaviors than merely viewing the behavior on film (Michael & Maccoby, 1961).

Coding teacher-pupil interaction requires the active participation of the learner in discriminating behaviors and provides the classifications which can function as mediators for the recall of the behaviors. Tinsley (1973) suggested that teachers fail to ask higher level questions because they are not able to distinguish high level from low level questions. The practice of coding teacher's questions and pupil's responses seems to enhance the teacher's ability to discriminate between the behaviors pinpointed by the observation system.

Peck and Tucker (1973) reviewed research using coding systems as training devices. Much of the research utilized Flanders Interaction Analysis System (Flanders, 1963). Although coding according to the Flanders system has been effective in changing teachers' behaviors, a study by Luebkemann (1966) suggests that merely learning the coding system is not nearly as effective as direct active attention to specific examples of behaviors.

An article on observation systems and the special education teacher by Semmel and Thiagarajan (1973) discussed preservice and inservice teacher training based on observation systems. At the Center for Innovation in Teaching the Handicapped, a Computer-Assisted Teacher Training System (CATTS) has used the coding of teacher-pupil interaction to teach specific behaviors. According to Semmel (1972), a major deterrent to the use of teacher-learner observational data in training has been the time spent in boring paper and pencil tasks such as coding, summarizing, and analyzing the information. CATTS represents an attempt to overcome this problem. The system collects, analyzes, stores and feeds back information relevant to teacher-pupil interaction during the instructional process. Feedback, either visual or auditory, can be provided in a fashion that creates minimum distraction for the teacher and pupils. The system has been used in classrooms removed from the computer site through direct on-line interface, Touch-Tone telephone interface, and magnetic tape devices called DATAMYTES. Within the context of a special education methods practicum, cognitive and management behaviors of teacher trainers in a classroom setting were modified (Semmel & Sitko, in preparation). Immediate and delayed feedback were compared. All trainees increased in their performance of self-selected skills as a function of the CATTS program.

Coding teacher-pupil interaction is simply a process of classifying behaviors after they occur. A similar activity is predicting a type of behavior before it occurs. The anticipation or prediction of teacher and pupil behavior requires evaluating past behaviors, applying knowledge of past behaviors to the present situation, and deducing what behavior the individual is most apt to emit.

Anticipation games have been developed in which players predict the responses of groups of children to various tasks (Semmel & Thiagarajan, 1974). The children are grouped according to age and intelligence quotients. The games typically consist of a sequence of anticipations followed by immediate feedback of what percentage of pupils in a particular group responded correctly. A pilot study provided some evidence that these games can be used to improve the players' skills in anticipating the responses of pupils. Baum (1973) attempted to increase teachers' understanding of retarded children as a function of playing a game designed to increase anticipation skills. Although playing the game increased the anticipation skills of the experimental teachers, those skills did not transfer to anticipations of their own pupils.

In past anticipation studies, predictions were of groups of pupils and feedback was based on normative data. Baum discussed the variability of children designated EMR and raised the question of whether response feedback based on percentages is meaningful. He suggested that, rather than the normative approach, further instruction in anticipation might be more successful if the analysis of behavior was conducted on an individual basis.

The activity of anticipating, applied to the individual, suggests a process of making the teachers' expectations for pupils more accurate and flexible. In addition, the use of systematic anticipations of model teachers' behaviors would cue the trainee to specific behaviors and force the trainee to attend to the sequence of teacher-pupil behaviors.

In summary, microteaching, minicourses, and computer-assisted teacher training have successfully modified teachers questioning skills, but these procedures are complex and expensive. In general, the successful procedures have used videotape instructional materials, but some research and an analysis of media attributes suggest that printed transcripts of teacher-pupil dialogue may be more efficient. Microteaching, minicourses, and CATTS have incorporated coding to train teachers to differentiate classroom behaviors. A cueing technique of anticipating classroom behaviors may lead to increased attention and involvement with the sequence of teacher-pupil behaviors. In order to increase the number of teacher trainees for whom the instruction is available, the most cost-effective combination of medium and activity for training teachers in questioning skills needs to be determined. Therefore, the present investigation compares videotape with written transcripts and coding with anticipation.

Summary

The present emphasis on performance-based teacher education has placed pressure on teacher educators to teach trainees interactive skills for the classroom. Researchers are being asked to develop efficient training modules that teach specific behaviors, as well as how to judge when to perform specific behaviors.

Data collected in classrooms indicate that teachers need training to improve their questioning skills. The literature reviewed depicts the classroom teacher, including the special education teacher, as a person who asks questions. The vast majority of the questions requires responses based on memory alone rather than on the manipulation or creative use of information. Research has demonstrated that teachers can learn to increase their use of higher level questions, but that low expectations for pupils designated educationally handicapped may keep the special education teacher from asking her/his pupils more thought-provoking questions. Therefore, the evidence that children in special education engage in productive thinking has significance for the training of special education teachers in the area of questioning behaviors.

Investigations of instructional procedures and materials employed to modify teachers' questioning behaviors, such as microteaching and minicourses, have demonstrated more efficient methods for teaching teachers specific skills than the traditional classroom lecture and student teaching approach. Comparisons of videotape instructional materials with transcripts of the videotapes indicate that the expense of videotapes may not be justified. The need to cue the learner to appropriate behaviors during training, whether the medium be videotapes or printed materials, has been established. The most effective activity for calling the learner's attention to the behaviors to be discriminated and learned has not yet been established. Two possibly effective activities are the coding of behavior and the anticipation of behavior.

The hypotheses that evolved from the above literature are presented and briefly discussed in the following chapter.

CHAPTER III

HYPOTHESES

The previous chapter discusses the research evidence and questions from which the hypotheses presented in this chapter are derived. The importance of instructing teacher trainees in attaining questioning skills for pupils designated educationally handicapped has been demonstrated. The literature is interpreted as strongly indicating that teacher trainees in special education must be taught: (1) to differentiate and generate questions which call for thought beyond the level of recall and (2) to phrase and sequence questions so that the pupils' responses represent such cognitive activity. The problem lies in developing or utilizing the most efficient instructional design for changing teacher trainees' questioning behaviors.

The hypotheses that follow reflect the belief that teachers of pupils labelled educationally handicapped can be taught to use high level questions. The position is taken that written materials are more effective than videotapes for presenting specific types of behavior to be learned. The activity of anticipating, as developed for this study, is expected to be an improvement over the simpler activity of coding. Furthermore, the performance of the teacher trainees in generating inferring and problem-solving questions is expected to show improvement after trainees proceed through a self-instructional manual (i.e., Training Manual) which teaches categories of questions and responses. Further improvement is expected after active involvement with teacher-pupil dialogues.

Comparisons Between Groups

Hypothesis 1: Teacher trainees who receive training designed to improve their questioning skills ask more inferring and problem-solving questions and elicit more appropriate responses from pupils with mild educational handicaps than teachers who do not have such training.

Various procedures have been used to increase teachers' use of higher level questions, but the instructional procedures incorporated in microteaching and minicourses seem to be especially successful (Borg, 1972; Peck & Tucker, 1973). Unfortunately, the cost of mini-courses, the cost of personnel time in microteaching, the dependency of both on the availability of pupils, and the complexity of training programs are limiting factors (Manis, 1973). Therefore, the first hypothesis reflects the position that training designed to be less expensive and less dependent on pupil time can be effective.

The first hypothesis predicts that training procedures designed to influence the expectations of teachers toward special class students can be effective in getting teachers to ask such pupils thought-provoking questions and obtain appropriate responses from those pupils. An attempt to increase the emphasis on higher level questions by teachers of children in special classes failed to demonstrate a change in their questioning behavior (Minskoff, 1967). Minskoff suggested that the instruction made no difference in the teachers' questioning because their instructional task was not in accord with their expectations of their pupils' abilities. The idea that teachers' expectations can affect their interaction with pupils is supported by the research reviewed by Brophy and Good (1974). Evidence that expectations for children in special education are too low is provided by Semmel, Garrett, Semmel, and Wilcove (1973). This suggests that evidence of the pupils' abilities must be provided before teachers will ask pupils higher level questions.

In the present investigation, four groups of trainees received instruction in questioning through the Training Manual. In addition, trainees received one of the four following treatments: anticipating videotapes (G_{AV}), coding videotapes (G_{CV}), anticipating written materials (G_{AW}), or coding written materials (G_{CW}). These four groups were expected to exceed the control group in their improvement in questioning skills. The control group (G_{TT}) did not receive any of the above training, but did participate in the criterion teaching task.

Hypothesis 2: Teacher trainees who read written versions of dialogues improve more in questioning skills than teacher trainees who view videotapes of teacher-pupil interaction.

Videotapes and written versions of videotapes may differ in cost, pacing, appeal, and realism. In two recent comparisons of these media, one study reported no difference in learning (Berliner & Codori, 1973), while the other reported superior gains with the written version (Gall, Dunning, Banks, & Galassi, 1972). Therefore, in light of the greater cost of videotapes, neither study justified the use of this medium. Factors put forth in using videotape in the instruction of teaching skills include its appeal and realism (Murray & Fitzgerald, 1971). A comparison of the attributes of the two media indicates that videotape usually has more positive attributes in the task category than does the print medium and fewer positive attributes in the learner, production, and distribution categories (Stolovitch, 1975). One important variable missing from the Stolovitch media/media attributes criteria is effectiveness. Based on the research of Gall et al. (1972), the second hypothesis predicts that those using written materials will demonstrate greater change in their questioning behavior than those using videotapes. The hypothesis is supported if the two groups reading the written version, i.e., anticipating written (G_{AW}) and coding written (G_{CW}) perform better in their questioning behavior than the two groups viewing the videotapes, i.e., anticipating videotapes (G_{AV}) and coding videotapes (G_{CV}).

Hypothesis 3: Teacher trainees who anticipate teachers' questions and pupils' responses improve their question skills more than teacher trainees who code teacher-pupil interactions.

The active participation of the learner and the activity of coding behaviors into symbols enhance the learning of special behaviors (Bandura, 1969; Michael & Maccoby, 1961). Systems of symbols for coding teacher-pupil interaction have been successful in instructing teachers in the discrimination of behaviors to be recalled and reenacted in the future (Peck & Tucker, 1973).

Tinsley (1973) found that teachers, at times, think they are asking high level questions when actually they are asking low level questions. The activity of coding questions into categories teaches the teacher to discriminate between different types of questions.

The activity of anticipating involves predicting what another person is going to say or do based on one's knowledge of past events. Teachers tend to underestimate the abilities of pupils labelled educationally handicapped (Semmel et al., 1973). This suggests that teachers need to be trained to anticipate more accurately. Baum (1973) concluded his study of anticipation by hypothesizing the superiority of anticipating an individual's behavior over that of anticipating typical behaviors of a specified group for improving the teachers' skills. Skill in anticipating a pupil's ability to respond enables a teacher to sequence questions for optimal learning and success experiences for the pupil. Thus, the activity of anticipating provides practice both in anticipating pupils' responses and in attending to specific kinds of behaviors. Because the activity of anticipating requires attention to the sequence of events and analysis of the situation to predict the next event, those who anticipate are expected to demonstrate a greater improvement in their questioning skills.

In addition, trainees who anticipate select the expected questions and responses from three options for each event. This means that the anticipators see more questions during training than the coders. Contact with a larger sample of possible questions for each category is expected to be reflected by a greater increase in inferring and problem solving questions asked by those who anticipated. The third hypothesis predicts that the anticipating videotape (G_{AV}) and anticipating written (G_{AW}) groups will demonstrate greater improvement in questioning than the coding videotapes (G_{CV}) and coding written (G_{CW}) groups.

Comparisons Between Trials

Hypothesis 4: Teacher trainees who work through the Training Manual generate more inferring and problem-solving questions than were generated before reading the Training Manual.

The self-instructional Training Manual was designed to teach the user to discriminate between binary, recall, inferring, and problem-solving questions. Apparently, teachers have difficulty distinguishing between high and low level questions (Tinsley, 1973). More than one hour of discrimination training would seem necessary, considering the difficulty teachers have in asking their pupils high level questions (Lynch & Ames, 1971a; Minskoff, 1967). Yet evidence can be found that learning to discriminate between behaviors is sufficient for teachers to change their behaviors (Konetski, 1970; Wagner, 1973). Therefore, the fourth hypothesis reflects the position that one hour of discrimination training is sufficient to make a significant difference in the ability of teacher trainees to ask high level questions. A repeated dependent measure, the Question Generation Exercise, was administered to trainees in four trials. To test the fourth hypothesis, the first trial, which occurred before the Training Manual, was compared to the three later trials of the Question Generation Exercise.

Hypothesis 5: Teacher trainees who anticipate or code teacher-pupil dialogues, generate a larger proportion of inferring and problem-solving questions than was generated before anticipating or coding the instructional dialogue.

Because active participation by the learner, such as coding behaviors into symbols, has been shown to enhance learning, those trainees anticipating or coding teacher-pupil dialogue are expected to learn how to ask more high level questions. Interaction analysis systems, i.e., Flanders (1962), have also been used successfully to change teachers' instructional behaviors. Both activities, anticipating and coding, would appear to teach trainees to discriminate between different types of behaviors. Such discrimination sets the stage for matching teachers' behavior to pupils' needs and to the instructional objectives. This hypothesis reflects the position that involvement with the examples of teachers' questions and pupils' responses allows the teacher trainee to evaluate ways of wording questions.

If the content of the teacher-pupil dialogues merely repeats what is learned from the Training Manual, or if the dialogues appear to be irrelevant to the trainees' task, then these additional materials are not expected to lead to an increase in higher level questions generated by the teacher trainees. If the dialogues provide needed practice, then teachers are expected to write more high level questions after anticipating or coding the dialogues than were written prior to these activities. Those trials of the Question Generation Exercise which occurred before the anticipating and coding of the dialogues were compared to the trials which followed the treatment in order to test the fifth hypothesis. The third and fourth trials were expected to demonstrate superior performance by the trainees when compared to their performance on the second trial of the Question Generation Exercise.

Summary

This chapter has presented five hypotheses which state that teacher trainees in special education courses can be taught to ask more high level questions. The hypotheses predict that anticipating written materials is the most effective treatment procedure. In addition, trainees are expected to improve in their questioning as a result of the Training Manual and demonstrate a second increase in the number of high level questions generated after anticipating or coding written or videotaped teacher-pupil dialogues. The following chapter describes the subjects, materials, and procedures which were utilized in testing the above hypotheses.

CHAPTER IV

METHOD

The current chapter provides information concerning the subjects, materials, procedures, design, and analysis of data for the present investigation. The descriptions which follow reflect the modifications and additions made as the result of a pilot study.

The hypotheses presented in the previous chapter differ from the hypotheses tested in the pilot study. The primary purpose of the pilot investigation was to evaluate the training materials, research design, and procedures used in training and data collection. The pilot study, "An Evaluation of Modules Designed to Modify Teachers' Questioning of Special Education Pupils," is reported in Appendix A. In this report, a description of the orignial hypotheses, training materials, and procedures is followed by a discussion of necessary additions and revisions in the present study based on the data analyses and the trainees' feedback to the investigator.

Subjects

The present study was conducted at two locations, a northern and a southern university. These two teacher training institutions differed in several ways. The northern university was located on the outskirts of Chicago, the third largest city in the United States, and drew most of its students from that city or its suburbs. The southern university was located in a small town surrounded by a hilly rural environment. Only a few of the students came from large urban areas. At the time of the study, the student populations of the northern and southern universities were approximately 23,000 and 6,500 respectively.

Teacher Trainees

The week-long training was completed by 50 students at the northern university, 38 students at the southern university. At the time of this study, the special education courses at the southern university were offered by the educational psychology department. Therefore, none of the students from the southern university were special education majors. All of the participants at the northern university were majoring in special education. Students enrolled in the Methods for Teaching the Mentally Handicapped courses at the northern university were required to participate. At the southern university, students from a variety of special education classes volunteered to participate. Table 2 presents data in regard to the age, sex, class, major, and years of teaching experiences of the subjects. Although the mean age of trainees differed little for the two locations (northern: $\underline{M} = 21.1$; southern: $\underline{M} = 21.9$), the range and variance were much greater at the southern site than at the northern site (northern: $\underline{SD} = 2.4$; southern: $\underline{SD} = 4.1$).

Pupils

The participation of intermediate special education pupils was limited to the Criterion Teaching Task, a dependent measure of the teacher trainees' questioning skills. The 10 pupils at the northern university attended special classes across the corridor from the

Table 2

Distribution of Teacher Trainee Variables

Variable	A Northern University N	A Southern University N
Age		
16-17	0	1
18-19	1	7
20-21	45	16
22-23	2	8
24-25	0	1
26-27	0	2
28+	2	3
Total	50	38
Sex		
Male	0	5
Female	50	33
Class		
Freshman	0	5
Sophomore	0	4
Junior	36	6
Senior	14	16
Graduate	0	7
Major		
Special Education	50	0
Education	0	36
Other	0	2

teacher trainees' classrooms. The 10 pupils at the southern university attended a special education resource room in a public elementary school located in the same town as the university. All of the pupils were able to verbalize, and none had severe hearing or speech problems. None of the pupils were severe behavior problems. Although the ages and abilities of these pupils varied greatly at both settings, they had all been judged mildly educationally handicapped by their school systems.

In summary, the subjects of the study were 50 special education teacher trainees from a northern university and 38 from a southern university. Twenty special education pupils, 10 at each setting, were asked questions by the subjects during the Criterion Teaching Task, an interactive dependent measure.

Instruments and Materials

Based on the data and impressions gathered during the pilot study, all instructional materials were reformulated and additional materials were developed. Only a few of the materials discussed below were available to all subjects. These materials included in the various treatments are described according to the particular condition in which they appeared. The dependent measures and handouts are described separately. A description of the research design and procedures clarifies the use of instruments and materials. Appendix B displays the materials which comprised the module for each experimental group.

Treatment Group Materials

Group which anticipated videotapes (G_{AV}).

1. Training Manual: The self-instructional Training Manual (see Appendix C) was, in part, an adaptation of the *Observer's Training Manual for the Individual Cognitive Demand Schedule* (Lynch & Ames, 1971). Only 3 of the 13 cognitive demands included in the ICDS Manual were used. These three categories are recall (Re), inferring (In), and problem solving (PS). Although the definitions for the three categories remained the same as those in the ICDS, the categories were interpreted more broadly through the questions supplied as examples for each category. Thus, each of the three categories included questions which would be classified in one of the other 10 categories when coded according to the original ICDS. In addition to the recall, inferring, and problem solving categories, the training manual described binary questions and their limitations.

The second half of the Training Manual presented three categories for classifying the pupils' responses to the teachers' questions. The three response categories are appropriate (A), inappropriate (Ia), and no response (NR). The Training Manual consisted of definitions of each category, descriptions of the differences between the categories, and exercises in coding examples and non-examples of each category. The manual also contained procedural instructions and detachable confirmation sheets. The self-instructional manual was designed so that college students could easily complete it within one hour.

2. Videotapes: Six new videotape segments replaced the three videotapes used in the pilot. Each videotape segment presented one teacher and one pupil; a different teacher and pupil were viewed in each segment. The six pupils were enrolled in special education classes in southern Indiana. The six persons who acted as teachers were working in the field of special education. These persons were experienced teachers and were involved in research which dealt with teachers' questioning behavior.

The videotaped teachers received the Training Manual, two short stories, some sample questions for each story, and an explanation of the purpose of the videotapes which included what they should do while being videotaped. The following instructions were emphasized: (1) avoid asking binary questions; (2) ask primarily inferring and problem-solving questions; (3) elicit as many appropriate responses as possible; and (4) speak slowly and clearly with pauses after the pupils' responses before the next question. Each videotaped teacher spent from 10 to 20 minutes talking with the pupil immediately preceding the videotaping sessions.

Each videotaped teacher read the short story, Munk the Chipmunk, to a pupil. Next, the teacher and the pupil were videotaped while the teacher asked the pupil questions suggested by the story, which the pupil answered. After a short break the teacher read a second story, Hobo, a Dirty Dog, to the pupil, and again their dialogue was recorded on videotape.

The editing of the videotapes consisted of inserting pauses before each recall, inferring, and problem-solving question, and between the question and the pupil's response. During these pauses in the dialogue, the number of the next question or response was visually presented. When a binary question had been asked or when the recorded words could not be understood, the pause was not inserted between the question and the response. Statements also preceded and followed the uninterrupted dialogue to indicate to the viewers that they were neither to anticipate nor code this interaction. In some cases, it was necessary to delete dialogue.

Each of the six videotape segments consisted of two parts, with fifteen questions and responses in each part, plus the unnumbered, uninterrupted dialogue. Besides the uninterrupted dialogue discussed above, the unnumbered dialogue included two introductory questions and responses. Preceding Segment I, Part A, of the videotapes is the practice segment which introduced the format of the videotapes and gave the viewers an opportunity to become familiar with the accompanying materials and tasks.

The videotapes, because of the editing process, were third generation copies. The videotapes were played back on Sony AV-3600 Videocorders and displayed on large screen Sony Monitors.

3. Anticipation Booklets: Teacher trainees chose from options contained in Anticipation Booklets (see Appendix D) to predict what would be said next in the teacher-pupil interaction. There were six anticipation booklets in a set, one booklet per segment, with the practice segment in a booklet with the first segment. Each

booklet was constructed of 4 by 5 inch cards joined by a ring in the left hand corner.

The booklets with the title and unnumbered interactions printed on blue cards were titled "Anticipation of Videotapes." Three questions a teacher might ask were presented on a white card which was read during the pause in the videotapes. The three questions represented the three categories (i.e., recall, inferring, and problem-solving) and were labelled accordingly as Re, In, and PS. The next white card presented three options for predicting the pupils' response to the question which had just been asked by the teacher on the videotape. The three responses represented the appropriate, inappropriate, and no response categories and thus were labeled A, Ia, or NR. After each anticipation was made and recorded, the question or response which actually did occur was viewed on the monitor.

4. Coding Booklets: Teacher trainees who anticipated the videotaped interactions recorded their anticipations in Coding Booklets (see Appendix E). These consisted of 12 coding sheets, one for each segment plus a coding sheet for the practice segment. All except the sheet for the practice segment had one box for each of the 15 interactions in every segment part. Each box had squares labeled Re, In, PS, A, Ia, and NR.

Group which coded videotape (G_{CV}).

1. Training Manual: The Training Manual was the same as described above for the anticipating videotape group (G_{AV}).

2. Videotape: The six videotape segments are those described above for G_{AV}.

3. Coding Booklets: Teacher trainees who coded the videotaped interaction recorded their codes in the Coding Booklets. These booklets were identical to those described above for G_{AV}.

4. Criterion Booklets: The trainees in G_{CV} compared their coding of the videotaped interaction with the codes in the Criterion Booklets (see Appendix E). The Criterion Booklets followed the same format as the coding booklets. The criterion booklet was created by comparing the codes of at least four experienced coders for each of the six videotape segments. Disagreements were reconciled by referring to the Training Manual.

Group which anticipated written (G_{AW}).

1. Training Manual: For a description of the Training Manual, see the group which anticipated videotape (G_{AV}) above.

2. Anticipation Booklets: The booklets with cream-colored cards were titled "Anticipation of Written Materials" (see Appendix D). Neither the videotapes nor the transcript was used in conjunction with these booklets. They contained the same dialogue as the transcript and the same options for anticipating as the booklets for anticipating the videotapes. In these booklets, the three teacher question options were printed on a white card. After one question was chosen as the most likely to have been asked, that card was flipped and the question the teacher actually asked was read from the top of the next white card. Printed below the teacher's question

were the three possible pupil responses. Again the card was flipped after the anticipation was made and recorded. The actual response appeared at the top of the next card with three teacher questions below the response. If the interaction which followed that response was not to be anticipated, then the three teacher question options would not appear and the unnumbered interaction would appear on a cream colored card following the actual response card.

3. Coding Booklets: The anticipations were recorded in the coding booklet described above for G_{AV}.

Group which coded written (G_{CW}).

1. Training Manual: This manual was the same as described above for G_{AV}.

2. Transcripts: The transcripts (see Appendix F) were written versions of the videotapes. They included all six segments and the practice segment. Unnumbered interactions, e.g., introductory dialogue, binary questions, were differentiated from the rest of the dialogue by the size and style of the print.

3. Coding Booklet: The codes of the transcript were recorded in the Coding Booklet described in G_{AV}.

4. Criterion Booklet: The Criterion Booklet is described above for G_{CW}.

Basic Materials

Stories. The six stories originally written for the pilot study were rewritten. These six stories, plus 13 new ones, were evaluated in terms of interest for an upper elementary school child and in terms of ease with which questions relating to the stories could be produced. According to the application of a readability formula (Dale & Chall, 1948), all of the stories were the fourth grade reading level. Also, all of the stories were approximately 200 words in length. The seven stories judged the least suitable were not included. Two stories thought to be at a high interest level, Hobo, a Dirty Dog and Munk, the Chipmunk, provided the basis for the questions and responses in the videotaped and written dialogue. Five other stories which appeared to be at a high interest level for children were read to the pupils in the Criterion Teaching Task. Those stories were A Shiny Blue Bike, The Hat, Inkspot, Meek the Field Mouse, and Sammy Squirrel. The remaining five stories, Fright in the Night, The Big Game, Tigger, A Wild Ride, and Willy the Woodchuck, were chosen for the Question Generation Exercise. Appendix G contains a copy of each story and a listing of the stories' readability scores and the number of words.

Instructions. The instructions to the subjects were distributed with the stories for each activity. The instructions included information concerning the materials to be used, the subjects' task, and the time sequence of events during the activity (see Appendix H).

Forms. Two information forms were given to each subject. One form elicited background information on teacher trainees; the other secured an evaluation of the training materials and procedures (see Appendix I).

Materials for Dependent Measures

Question Generation. The pencil-and-paper exercise of generating questions served both as a training task and as a repeated dependent measure. The exercise booklets were designed so that the

the task could be repeated up to five times. Each booklet included the instructions for generating the questions, five short stories, and paper for writing the questions following each story. No two question generation booklets contained the same sequence of stories. The instructions asked the teacher trainees to write as many inferring and problem-solving questions as possible that were appropriate for a child with a CA of 10 years and MA of approximately 7 years. The instructions stated that the questions did not need to be directly related to the story but that they should not be binary questions. The instructions remained the same each time questions were generated. Stop watches were used to time the reading of the stories and the writing of the questions.

Criterion Teaching Task. The Criterion Teaching Task was developed as a dependent measure of the preceding training. Each teacher trainee received one of five stories and instructions for the task. The instructions described the situation, listed the times allowed for each step, and defined the teacher trainees' task. The teacher trainees were told to ask their pupil inferring and problem-solving questions, to elicit as many appropriate responses from the pupil as they could, and to avoid asking "yes/no" type questions. Stop watches were used to time the preparation period and the teaching task. The teaching task was recorded on audiotape using the internal microphones of the Sony 800B. Instructions for speaking and for operating the tape recorders covered the window of the tape recorder so that the movement of the reels was not visible.

Procedure

At both the southern and northern universities, the experiment was conducted during a period of five days. The basic procedure remained the same in both locations, although some variations occurred due to scheduling difficulties with a few subjects and technical problems with the audiotape recorder. The following relates which of those materials described above were used with each of the five groups. The procedure is presented according to the day-by-day sequence of activities. Table 3 displays the sequence of events for the five groups during the five days.

For all activities except the self-instructional Training Manual, instructions were provided both in written form and orally. All materials were collected at the end of every session, and it was explained to the subjects why they were not to discuss the activities or materials with anyone until the following week.

Day One

As they arrived for their first session, subjects signed a numbered sheet. The numbers had previously been randomly assigned to one of the following five groups: (1) anticipating videotapes, G_{AV}; (2) coding videotapes, G_{CV}; (3) anticipating written materials, G_{AW}; (4) coding written materials, G_{CW}; (5) criterion teaching task only, G_{TT}. All subjects filled out a form for Information on Teacher Trainees. Before questions were answered or the purpose of the training activities was discussed, all subjects were asked to follow the instructions for the Question Generation Exercise.

Table 3

The Sequence of Treatment and Testing

	Day One					Day Two	Day Three		Days Four and Five		
	Background Information	Question Generation Exercise Trial 1	Overview	Training Manual	Question Generation Exercise Trial 2	Treatment	Treatment	Question Generation Exercise Trial 3	Criterion Teaching Task	Question Generation Exercise Trial 4	Evaluation Form
Groups:											
Anticipating Videotapes	X	X	X	X	X	Anticipate Videotapes 1, 2, & 3	Anticipate Videotapes 4, 5, & 6	X	X	X	X
Coding Videotapes	X	X	X	X	X	Code Videotapes 1, 2, & 3	Code Videotapes 4, 5, & 6	X	X	X	X
Anticipating Written	X	X	X	X	X	Anticipate Written Booklets 1, 2, & 3	Anticipate Written Booklets 4, 5, & 6	X	X	X	X
Coding Written	X	X	X	X	X	Code Transcript Segments 1, 2, & 3	Code Transcript Segments 4, 5, & 6	X	X	X	X
Teaching Task Only	X	X	X						X	X	X

This exercise was timed according to the sequence stipulated in the instructions. (For the Question Generation Instructions, see Appendix H.) After generating questions, subjects were told the number of the group to which they were assigned. Those assigned to the fifth group, the control group (G_{TT}), moved to a separate room where the purpose of the experiment (Overview for Group V, see Appendix J) was read to them. The fifth group was dismissed after scheduling arrangements for the Criterion Teaching Task were made.

The remaining four groups, G_{AV}, G_{CV}, G_{AW}, and G_{CW}, listened to an Overview (see Appendix J) and then worked through the self-instructional Training Manual. After completing the Training Manual, members of the four experimental groups completed the Question Generation Exercise for the second time. Information to be used in scheduling subjects during the Criterion Teaching Task was collected, and the subjects were reminded of the rest of the week's schedule. The first day's sessions consumed about two hours for the experimental subjects and approximately 45 minutes for the control subjects.

Day Two

The next day, the experimental groups, G_{AV}, G_{CV}, G_{AW}, and G_{CW}, convened in four separate rooms to practice anticipating or coding questions and responses. The fifth group (northern: N = 10; southern: N = 8), G_{TT}, did not participate during the second and third days of the study. Appendix H contains the instructions for each treatment.

$\underline{G_{AV}}$: Each subject in the first group (northern: N = 10; southern: N = 5) received the Instructions for Anticipating Videotapes, the stories, (Hobo, A Dirty Dog and Munk the Chipmunk), the first three Anticipation of Videotape Booklets, and a Coding Booklet. An experimenter operated the videotape playback equipment and answered questions after the practice segment. Time was provided before each segment part to study the stories and between segments for relaxation.

$\underline{G_{CV}}$: Each subject in the second group (northern: N = 10; southern: N = 8) received the Instructions for Coding Videotapes, the two stories, and a Coding Booklet. The experimenter's task was the same as that of the experimenter for the first group. Again, breaks between segment parts and segments were provided.

$\underline{G_{AW}}$: Each subject in the third group (northern: N = 10; southern: N = 9) received the Instructions for Anticipating the Written Materials, the two stories, the first three Anticipation of Written Materials Booklets, and a Coding Booklet. Although an experimenter remained available after answering questions following the practice segment, each member of this group was free to work at her/his own speed.

$\underline{G_{CW}}$: Each subject in the fourth group (northern: N = 10; southern: N = 8) received the Instructions for Coding Written Materials, the two stories, the transcript, and a Coding Booklet. Members of this group were told to code only the first three segments and then were allowed to work at their own pace.

The first two groups, G_{AV} and G_{CV}, finished in approximately one hour; members of the third and fourth groups, G_{AW} and G_{CW}, completed their tasks within 35 to 50 minutes.

Day Three

On the third day, the four experimental groups assembled in separate rooms to anticipate or code questions and responses as they had done on the previous day. The materials and activities were the same with two exceptions. This time, the Anticipation Booklets, videotapes, and transcripts dealt with the last three segments. Secondly, after anticipating or coding the teacher-pupil dialogue, all participants of the four experimental groups generated questions for the third time.

On the third day, the videotape groups, G_{AV} and G_{CV}, again finished in an hour. Most of the subjects working with written materials, G_{AW} and G_{CW}, finished within 40 minutes.

Days Four and Five

All subjects were scheduled for an hour on either the fourth or fifth day. A maximum of five subjects was scheduled for any one arrival time. Each of the five represented a different group except in those cases where class conflicts required some alterations in the schedule. Only two such alterations were necessary at the northern university, but ten such changes were required at the southern university.

Each subject received the Criterion Teaching Task Directions (see Appendix H) and one of the five stories (see Appendix G) chosen for the Criterion Teaching Task. Within the two university settings, the stories had been previously assigned to subject numbers so that a story would be used at least once but not more than twice in each group.

After approximately six minutes of studying and making notes on the story, each subject was given the number of a tutorial room. Each small room contained two chairs facing a small table. An audio tape recorder was located near the center of each table. Each subject spent five minutes or so becoming acquainted with the pupil assigned to her/him. The pupils were members of intermediate special classes at the northern university and members of a special education resource room at the southern site. Ten pupils took part in the criterion task at the northern university, and ten participated at the southern university. At both universities, each pupil's number was paired with a story number and a subject number so that a pupil heard a different story each time s/he was taught and so that a pupil was paired with one teacher trainee from each group. This tightly balanced schedule required 10 subjects in each group. On the days of the Criterion Teaching Task at the northern university, 10 subjects from each group were available. At the southern university, the number of subjects available on the fourth and fifth days varied from five to nine persons per group. Thus, at the southern university, a completely balanced schedule of stories and pupils was not maintained, but the same format was followed as closely as possible.

After the teacher trainee and the pupil had some time to become acquainted, an experimenter entered and suggested that the teacher trainee read the story to the pupil. After the story had been read, the experimenter returned and recited the instructions on how to proceed, including how to speak so that both voices would be clearly recorded. The experimenter then started the audiotape recorder. Eight minutes later, the experimenter returned to stop the tape recorder, thus ending the teaching task.

After the teaching task, all subjects generated questions. For participants of groups one through four, this was the fourth time they had performed the pencil and paper task. For members of the fifth group (G_{TT}), this was their second opportunity to complete the Question Generation Exercise. As a last task, all subjects were asked to evaluate those activities and materials they had used (see Appendix I for the Evaluation Form).

After this activity, all subjects could pick up a copy of the Training Manual and ask questions concerning the study.

Design and Analysis of Data

Design

The design was a 2 x 2 factoral with repeated measures across days and a control group. Figure 2 depicts the basic design of the study. Table 3 (p. 73) portrays the repeated measures over days.

Coding of Subjects' Questioning

Question Generation Exercise. The questions written by the subjects during the Question Generation Exercise were coded according to

Figure 2

Design of the Study

CUEING ACTIVITY	EXPERIMENTAL GROUPS MEDIA		CONTROL GROUP
	VIDEOTAPE	WRITTEN	NO TREATMENT
ANTICIPATING	AV	AW	
CODING	CV	CW	

the categories defined in the Training Manual. When a question clearly did not fit into the binary, recall, inferring, or problem solving category, the question was coded as "other" (O). Very few questions fell into this added category.

A consensus coding procedure was adopted in which two individuals with previous coding experience coded all questions and then compared their codings of the questions. When their codes differed, they came to consensus based on what was most consistent with the Training Manual. A third experienced coder arbitrated disagreements. This procedure provided a check against various types of errors, including not coding some questions accidently. At times, the coders would disagree on the number of questions within a subject's exercise because of the difficulty in deciding when a statement was actually a new question. In some cases, a question was asked more than once with very little rewording. The coders categorized each statement which asked for different information or thought processes from the pupil.

Criterion Teaching Task. The audiotape recordings of the subjects' questions and their pupils' responses were transcribed by one secretary and checked for accuracy by a second secretary and a research assistant. The transcripts of the recorded dialogue were coded according to questions and response categories defined in the Training Manual. As with the coding of the Question Generation Exercise described above, the question category of "other" was added to the categories defined in the Training Manual. No additional categories were needed for coding the pupil responses.

The same basic procedure and the same coders were used as those for coding the Question Generation Exercise. One major difference in the coding procedure was determining which statements to code as the actual questions asked. In the Criterion Teaching Task, only those questions were coded that were followed by a pause long enough for a pupil to respond. Thus, when a subject asked a series of questions, only the last question was coded. Also, repeated questions were coded as new questions unless there were no intervening questions; in this latter case, the repeated question was considered merely to be prompting. Generosity prevailed in the coding of the appropriateness of the pupils' responses. Any questions or responses in which a majority of the words was inaudible were not coded. In most cases when words were not clear, the context provided sufficient cues for coding.

Analysis of Data

After the Question Generation Exercises were coded, a count was made of the number of questions per category that a subject wrote during each trial of the exercise. For the Criterion Teaching Task, the number in each question category, the number in each response category, and the number of appropriate responses to each type of question were tabulated for all subjects. In addition, background information on the subjects and responses to the evaluation form were coded numerically.

Comparisons between groups. To test which treatment groups produced more inferring and problem-solving questions, as well as more appropriate responses from the children, than the other group(s), the following five measures were utilized (see Table 3):

(1) The proportion of inferring (In) and problem solving (PS) questions generated on Trial 3 of the Question Generation Exercise. (This dependent variable does not apply to Hypothesis 1.)

(2) The proportion of *In* and *PS* questions generated on Trial 4 of the Question Generation Exercise.

(3) The proportion of *In* and *PS* questions asked during the Criterion Teaching Task.

(4) The proportion of appropriate (*A*) responses elicited from pupils during the Criterion Teaching Task.

(5) The proportion of *A* responses to *In* and *PS* questions asked during the Criterion Teaching Task.

The last two dependent measures described above reflect not only the teacher trainees' performance but also that of the pupils.

Comparison between trials. Only the results of the Question Generation Exercise comprise the dependent measures for the comparisons between trials (see Table 3). Also, these analyses are limited to the change in performance of the four experimental groups.

Statistical analyses. All of the hypotheses were tested through analysis of variance or covariance with planned comparisons. In addition, correlation analyses were employed on the background information of the subjects, items from the evaluations of the activities and materials, and the subjects' scores on the Question Generation Exercise and Criterion Teaching Task.

This chapter has described the revised materials, procedures, design, and the analysis of the data. The chapter which follows presents the results of the data analyses.

CHAPTER V

RESULTS

The procedures described in Chapter IV produced the data summarized in this chapter. The results are discussed in terms of their implications for the validity of the previously stated hypotheses. In addition, the relationships between the dependent variables are reported.

The hypotheses were tested separately for the two locations. At the northern site, the number of subjects per treatment group differed between the Question Generation Exercise and the Criterion Teaching Task. The data for the Criterion Task were generated from audiotaped teacher trainee-pupil dialogues. Unfortunately, one side of one tape remained blank. Thus, the data from five subjects, one from each group, were missing from the Criterion Teaching Task. Otherwise, the results are based on 10 subjects per group at the northern site.

The groups at the southern site were uneven in number because of a differential loss of seven subjects during the week-long training. Those results are based on groups of five (G_{AV}), eight (G_{CV}), nine (G_{AW}), eight (G_{CW}), and eight (G_{TT}) subjects.

Comparisons of Groups

The first three hypotheses were tested through comparisons of the treatment groups. Both the Question Generation Exercise and the Criterion Teaching Task provided data for evaluating the success of the different training materials.

Hypothesis 1

The first hypothesis predicted that those trainees who received training in questioning (G_{AV}, G_{CV}, G_{AW}, G_{CW}) would ask more high level questions and more frequently obtain adequate, relevant answers from special education pupils than teacher trainees who did not receive training (G_{TT}). This hypothesis compared the groups who studied the Training Manual and received practice differentiating questions and responses with the control group who had neither experience. The four experimental groups also had more experience generating questions. These groups generated questions during four trials with the paper-and-pencil exercise, while the control group (G_{TT}) participated only in the first and fourth trials of the Question Generation Exercise. The first and fourth trials functioned as pretests and posttests for all five groups.

The proportion of inferring and problem-solving questions written during the first trial became the covariate for analyzing those questions written by the five groups on the fourth trial. The comparisons of the four experimental groups (G_{AV}, G_{CV}, G_{AW}, and G_{CW}) with the control group (G_{TT}) at both the northern and southern sites were highly significant (northern: $F = 9.81$; $df = 1,44$; $p < .005$. southern: $F = 19.97$; $df = 1,32$; $p < .005$; see Table 4). Table 5 displays the means, adjusted and unadjusted, for the five groups. An examination of Figure 3 and Table 6 also show that the results of the Question Generation Exercise support the first hypothesis.

The results of the Criterion Teaching Task provided support for the first hypothesis at one location, but not at the other. The three

Table 4

Question Generation Exercise

Analysis of Covariance and Planned Comparisons

Trial 4 Adjusted on Trial 1 for All Five Treatment Groups

SOURCE	A Northern University			A Southern University		
	df	MS	F	df	MS	F
Between Groups	4	0.222		4	0.290	
Hypothesis 1: Exper < Control	1	0.562	10.41***	1	0.772	21.69***
Hypothesis 2: Written < Video	1	0.130	<1.0	1	0.100	2.82
Hypothesis 3: Antic < Code	1	0.303	6.05	1	0.204	5.73
Within Groups	44	0.054		32	0.036	
TOTAL	48			36		

*** $p < .005$

Table 5

Question Generation Exercise

Means, Adjusted Means, and Standard Error

Trial 4 Adjusted on Trial 1

Groups	A Northern University			A Southern University		
	Mean	Adjusted Mean	SE for adjusted mean	Mean	Adjusted Mean	SE for adjusted mean
G_{AV}	0.642	0.643	0.073	0.770	0.753	0.085
G_{CV}	0.770	0.784	0.074	0.760	0.784	0.067
G_{AW}	0.566	0.573	0.074	0.531	0.504	0.064
G_{CW}	0.797	0.780	0.074	0.767	0.796	0.078
G_{TT}	0.436	0.430	0.074	0.369	0.358	0.067

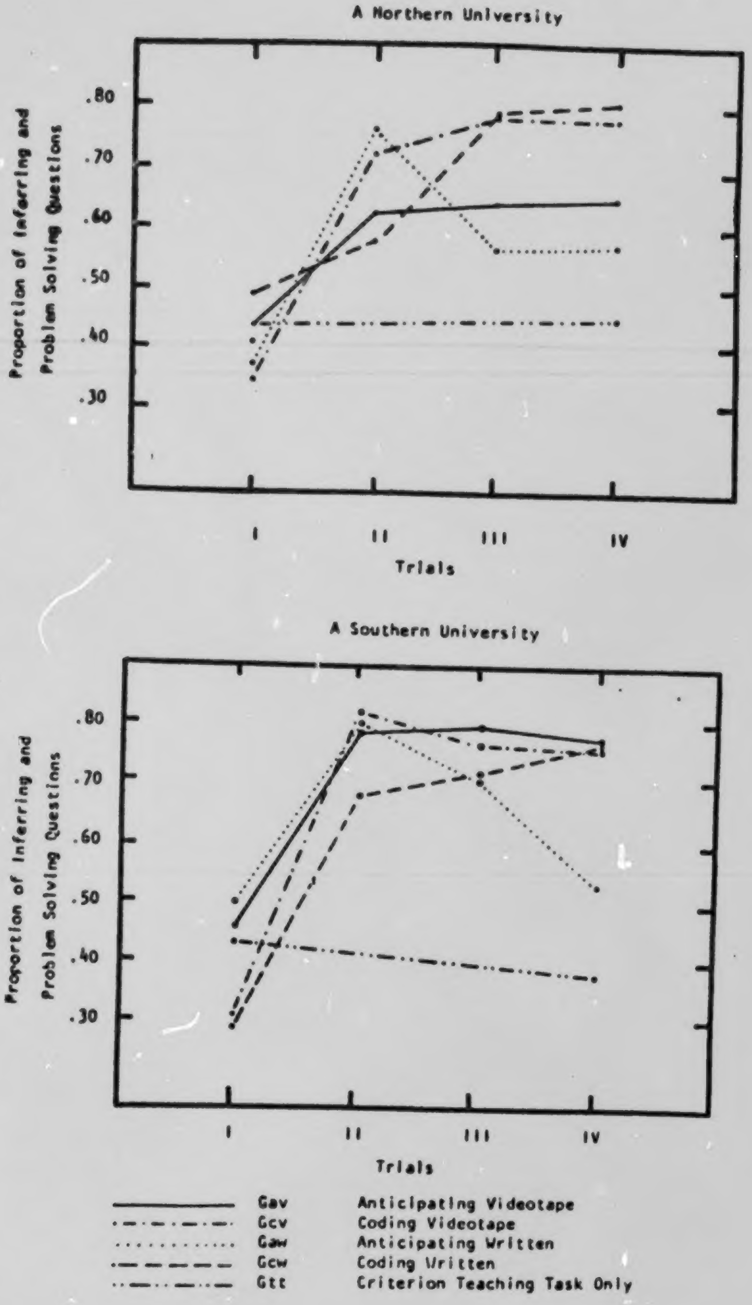

Figure 3. Graphs of the five treatment groups' questioning scores on the four trials of the Question Generation Exercise.

Table 6

Question Generation Exercise

Unadjusted Means and Standard Deviations on all Four Trials for the Five Treatment Groups

Groups	A Northern University								A Southern University							
	1		2		3		4		1		2		3		4	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
G_{AV}	0.402	0.245	0.623	0.258	0.639	0.216	0.642	0.249	0.455	0.314	0.785	0.117	0.797	0.092	0.770	0.099
G_{CV}	0.341	0.312	0.723	0.252	0.781	0.216	0.770	0.180	0.308	0.116	0.821	0.170	0.767	0.242	0.760	0.202
G_{AW}	0.372	0.188	0.753	0.249	0.557	0.254	0.566	0.278	0.491	0.352	0.800	0.263	0.706	0.199	0.531	0.225
G_{CW}	0.486	0.268	0.579	0.284	0.783	0.252	0.797	0.155	0.287	0.249	0.680	0.229	0.715	0.223	0.767	0.175
G_{TT}	0.433	0.256					0.436	0.289	0.430	0.306					0.369	0.237

dependent measures used to analyze the Criterion Task were the proportion of inferring (*In*) and problem-solving (*PS*) questions asked by the teacher trainees, the proportion of appropriate responses (*A*) given by the pupil, and the proportion of *In* and *PS* questions responded to appropriately by the pupil. None of the three measures reached significance in the comparison of the four treatment groups versus the control group at the northern university (see Table 7). At the southern university, the teacher trainees in the treatment groups clearly asked more *In* and *PS* questions than those in the control groups ($F = 11.92$; $df = 1,33$; $p < .005$). In addition, the pupils when questioned by trainees in the treatment groups responded appropriately to a much greater extent ($F = 8.66$; $df = 1,33$; $p < .005$). Table 8 presents these results. Table 9 also reports the lack of significance of the third measure, the proportion of *In* and *PS* questions which elicited *A* responses. It would seem that the greater proportion of *A* responses from the pupils when questioned by treatment subjects is due to *A* responses to recall and binary questions. Yet Table 9 indicates that all groups had very high mean proportions of *A* responses to *In* and *PS* questions. Figure 4 displays the means on the three dependent variables for both locations.

In summary, the first hypothesis is supported by two out of three measures within the Criterion Teaching Task at the southern university, and not supported by the results of the Criterion Task at the northern university.

Table 7

Criterion Teaching Task

A Northern University

Analyses of Variance and Planned Comparison

SOURCE	Proportion of Inferring + Problem Solving Asked by Ss			Proportion of Appropriate Responses From Pupils			Proportion of Inferring + Problem-Solving Questions Eliciting Approp. Responses		
	df	MS	F	df	MS	F	df	MS	F
Groups	4	0.070		4	0.005		4	0.015	
Hypothesis 1: Exper > Control	1	0.050	2.39	1	0.000	<1.0	1	0.040	2.51
Hypothesis 2: Video < Written	1	0.149	7.08	1	0.009	<1.0	1	0.000	<1.0
Hypothesis 3: Antic < Code	1	0.078	3.71	1	0.001	<1.0	1	0.003	<1.0
Error	40	0.021		40	0.011		40	0.016	
TOTAL	44	0.026		44	0.010		44	0.016	

Table 8

Criterion Teaching Task

A Southern University

Analyses of Variance and Planned Comparison

SOURCE	Proportion of Inferring + Problem Solving Asked by Ss			Proportion of Appropriate Responses From Pupils			Proportion of Inferring + Problem-Solving Ques. Eliciting Approp. Resp.		
	df	MS	F	df	MS	F	df	MS	F
Groups	4	0.153		4	0.040		4	0.025	
Hypothesis 1: Exper > Control	1	0.464	11.92***	1	0.209	8.66***	1	0.039	1.09
Hypothesis 2: Video < Written	1	0.131	3.33	1	0.003	<1.0	1	0.019	<1.0
Hypothesis 3: Antic > Code	1	0.010	<1.0	1	0.018	<1.0	1	0.011	<1.0
Error	33	0.039		33	0.024		33	0.036	
TOTAL	37	0.051		37	0.026		37	0.035	

***p < .005

Table 9

Criterion Teaching Task

Means and Standard Deviations for the Five Treatment Groups

Dependent Variables	Groups	A Northern University		A Southern University	
		Mean	SD	Mean	SD
Proportion of Inferring and Problem-Solving Questions Asked by Teacher Trainees	G_{AV}	0.488	0.181	0.615	0.050
	G_{CV}	0.603	0.067	0.594	0.278
	G_{AW}	0.382	0.138	0.420	0.175
	G_{CW}	0.452	0.166	0.518	0.236
	G_{TT}	0.398	0.145	0.263	0.123
Proportion of Appropriate Responses from Pupils	G_{AV}	0.720	0.114	0.635	0.166
	G_{CV}	0.702	0.101	0.633	0.170
	G_{AW}	0.659	0.112	0.604	0.151
	G_{CW}	0.701	0.123	0.706	0.184
	G_{TT}	0.695	0.065	0.511	0.093
Proportion of Inferring and Problem-Solving Questions Which Elicited Appropriate Responses	G_{AV}	0.825	0.128	0.767	0.148
	G_{CV}	0.767	0.106	0.751	0.102
	G_{AW}	0.787	0.131	0.764	0.244
	G_{CW}	0.811	0.157	0.858	0.148
	G_{TT}	0.872	0.104	0.705	0.243

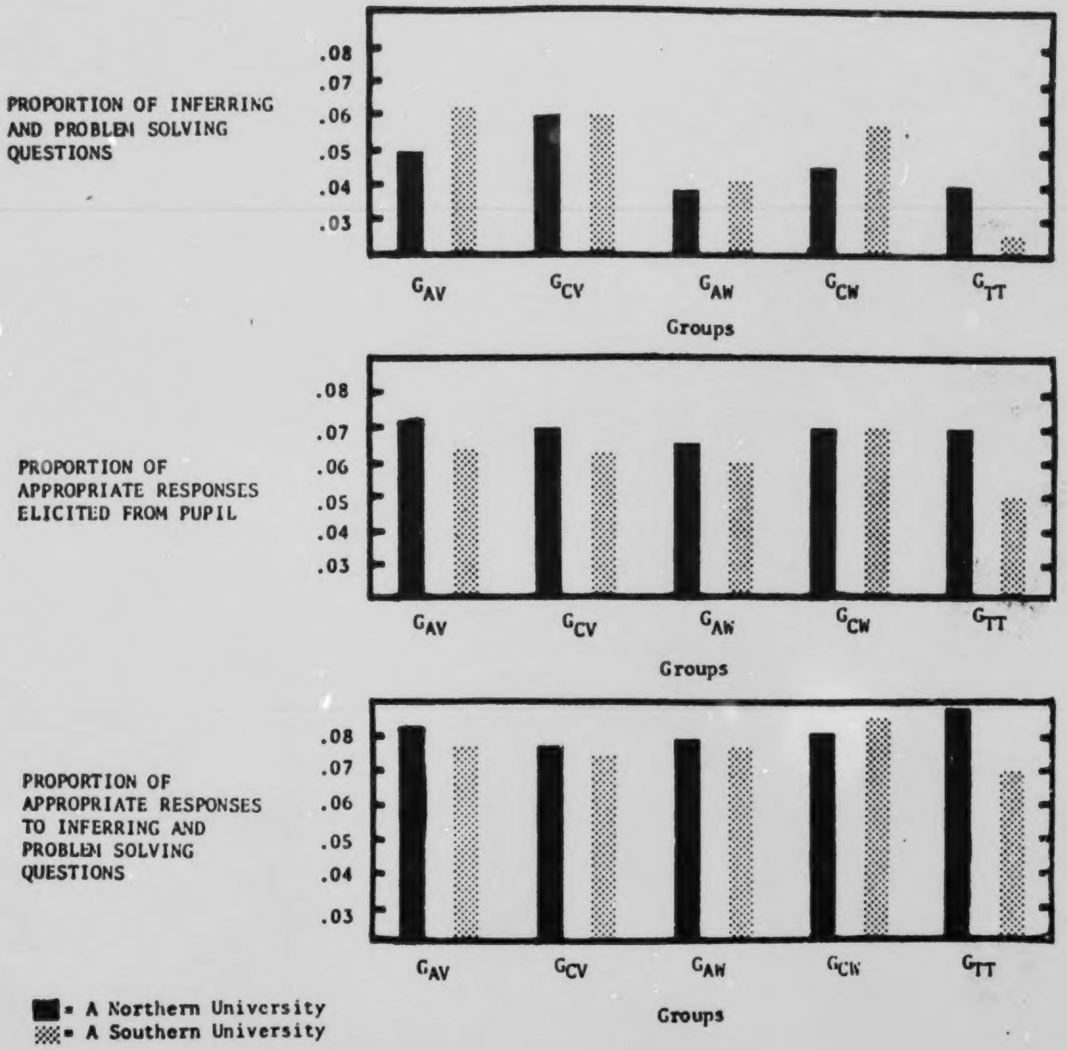

Figure 4. Graph of Criterion Teaching Task

Hypothesis 2

The second hypothesis stated that the written version would be more effective than the videotape for presenting practice material designed to improve teacher trainees' questioning skills. To test this hypothesis, the two groups who read written teacher-pupil dialogue (G_{AW} and G_{CW}) were compared to the two who viewed the videotapes of the dialogues (G_{AV} and G_{CV}).

As shown in Table 3, the training by written or videotape materials occurred after the second and before the third trial of the Question Generation Exercise. Therefore, the planned comparison of the written versus videotape groups used the adjusted means from an analysis of covariance in which the second trial was the covariate in the analysis of the third trial. As shown in Table 10 the comparison failed to demonstrate a difference based on the media by which the material was presented.

After the third Question Generation Exercise, the trainees participated in a simulated teaching encounter similar to that presented in the videotape and written material. In both, teachers questioned pupils enrolled in special education programs. It was thought that a difference based on media would be more apparent in the fourth trial of the Exercise because this trial followed the Teaching Task. Again, the second trial was the covariate and the adjusted means of the groups G_{AV} and G_{CV} were compared to the means of the groups G_{AW} and G_{CW} (Table 11). The results of this analysis were consistent with that for Trial 3. No significant differences

Table 10

Question Generation Exercise

Analyses of Covariance and Planned Comparisons

Trial 3 Adjusted on Trial 2

Four Experimental Groups

SOURCE	A Northern University			A Southern University		
	df	*MS*	*F*	*df*	*MS*	*F*
Between Groups	3	0.181		3	0.012	
Hypothesis 2: Video < Written	1	0.013	<1.0	1	0.011	<1.0
Hypothesis 3: Antic > Code	1	0.414	11.24	1	0.001	<1.0
Within Groups	35	0.037		25	0.033	
TOTAL	38			28		

Table 11

Question Generation Exercise

Analyses of Covariance and Planned Comparison

Trial 4 Adjusted on Trial 2

Four Experimental Groups

SOURCE	A Northern University			A Southern University		
	df	MS	F	df	MS	F
Between Groups	3	0.165		3	0.150	
Hypothesis 2: Video < Written	1	0.005	<1.0	1	0.041	2.14
Hypothesis 3: Antic > Code	1	0.382	10.41	1	0.137	7.15
Within Groups	35	0.037		25	0.019	
TOTAL	38			28		

were found between the performance of trainees who read written dialogues and the performance of those who heard and watched the videotaped teacher-pupil interaction.

For the teacher trainees, the Criterion Teaching Task required seeking appropriate responses to high level questions. They followed the same directions as those given to the teachers in the videotaped or written dialogues. The prediction that the written materials would produce better questions and responses was not upheld. Although the F ratios for the proportion of In and PS asked appear to be statistically significant at both sites (Table 8 and Table 9), an examination of the group means (Table 10) leads to the conclusion that the difference between the means is opposite to that predicted (see also Figure 3, p. 87).

In summary, the second hypothesis was not supported. The results did not demonstrate greater improvement in the questioning skills of teacher trainees who used the written instructional materials rather than the videotaped materials.

Hypothesis 3

The third hypothesis predicted that the activity of anticipating teachers' questions and pupils' responses would produce greater development of questioning skills than the activity of coding such dialogues. The results of the two groups who anticipated (G_{AV} and G_{AW}) were compared to those of the two groups who coded (G_{CV} and G_{CW}). The dependent measures and analyses for testing this hypothesis followed the same format as described above for the second hypothesis. Table 3 depicts the sequence of training and testing.

The third Question Generation Exercise, which followed the two activities, was adjusted for the subjects' scores on the second Exercise, which preceded the two activities (Table 10). Comparison of the means did not demonstrate anticipation to be a superior training activity. A large _F_ ratio in the opposite direction at the northern site raised questions that are discussed in Chapter VI.

This phenomenon of a large _F_ ratio, but lack of support for the hypothesis, was repeated at both sites when the fourth trial was adjusted on the second trial and the comparison made (Table 11). Again, Table 12 and Figure 3 makes clear the direction of the differences between the groups. The comparison of the anticipation groups with the coding groups on the Criterion Teaching Task gave no support for greater improved performance of the anticipators over the coders (Tables 8 & 9, and Figure 4).

In summary, the third hypothesis received no support. An examination of the means clearly indicates that the activity of anticipating does not lead to superior gains in questioning skills when compared to the activity of coding.

Comparison Between Trials

The results of the Question Generation Exercise comprised the only dependent measures for the fourth and fifth hypotheses. These two hypotheses were tested by comparing the treatment subjects' performance on the four trials.

Table 12

Question Generation Exercise

Means, Adjusted Means, and Standard Error

Trials Three and Four Adjusted on Trial

Two for the Four Experimental Groups

		A Northern University			A Southern University		
	Groups	Mean	Adjusted Mean	SE for adjusted Mean	Mean	Adjusted Mean	SE for adjusted Mean
Trial Three	G_{AV}	0.639	0.663	0.061	0.797	0.790	0.081
	G_{CV}	0.781	0.752	0.061	0.767	0.742	0.064
	G_{AW}	0.557	0.512	0.061	0.706	0.692	0.060
	G_{CW}	0.783	0.831	0.062	0.715	0.760	0.066
Trial Four	G_{AV}	0.642	0.663	0.061	0.770	0.761	0.062
	G_{CV}	0.770	0.746	0.061	0.760	0.729	0.049
	G_{AW}	0.566	0.529	0.061	0.531	0.513	0.046
	G_{CW}	0.797	0.837	0.061	0.767	0.824	0.050

Hypothesis 4

The fourth hypothesis asserted that the Training Manual would be sufficient instruction to teach trainees to generate more inferring and problem-solving questions. The first trial of the Question Generation Exercise preceded the Training Manual. The other three trials of the same exercise occurred after the trainees completed the Training Manual. Therefore, a comparison of the first trial with the second, third, and fourth trials provides information concerning the effectiveness of the Training Manual. Very great improvement took place (see Table 13), although some improvement could have occurred because the subjects had increased familiarity with the exercise on the second trial. At both university settings, highly significant differences were found between scores on the first and later trials (northern: $\underline{F} = 46.24$; $\underline{df} = 1{,}108$; $\underline{p} < .001$. southern: $\underline{F} = 173.04$; $\underline{df} = 1{,}78$; $\underline{p} < .001$). Thus, it appears the instruction in differentiating categories of questions greatly assisted the trainees in generating questions of specific types. Figure 2 visually displays the increase in scores of the treatment groups from Trial 1 to Trial 2. The means are presented in Table 14.

Hypothesis 5

The last hypothesis stated that practice, whether anticipating or coding the videotaped or written materials would significantly improve a trainee's ability to generate inferring and problem-solving questions. As Figure 3 indicates, the practice of discriminating between types of questions separated the second trial from the third

Table 13

Question Generation Exercise

Analyses of Variance and Planned Comparison On the Four Trials for the Four Experimental Groups

SOURCE	A Northern University			A Southern University		
	df	MS	F	df	MS	F
Between Groups	39			29		
Groups	3	0.089	<1.0	3	0.045	<1.0
Subjects Within Groups	36	0.118		26	0.133	
Within Subjects	120			90		
Trials	3	0.687		3	0.921	
Hypothesis 4: Trial 1 < Trials 2, 3, & 4	1	2.049	46.25****	1	2.788	173.04***
Hypothesis 5: Trial 2 < Trials 3 and 4	1	0.134	1.0	1	0.036	2.23
Groups x Trials	9	0.094	2.12*	9	0.054	3.38***
Trials x Subjects Within Groups	108	0.044		78	0.016	

* $p < .05$
*** $p < .005$
**** $p < .001$

Table 14

Question Generation Exercise

Means and Standard Deviations of the Four

Trials for the Four Experimental Groups

	A Northern University		A Southern University	
Trials	Mean	SD	Mean	SD
1	0.401	0.253	0.382	0.273
2	0.669	0.261	0.771	0.209
3	0.690	0.246	0.740	0.199
4	0.694	0.233	0.695	0.211

and fourth trials of Question Generation Exercise. The comparison of the second trial with the third and fourth indicated that no significant improvement in questioning skills was obtained due to the training (see Table 13). Some increase in score might be expected, again due to past experience with the Exercise. Table 14 displays the means for the four trials at both settings. The mean proportion of inferring and problem-solving questions on the second trial reached such a height that an increase in these categories became impossible for some subjects who had previously obtained perfect scores. Thus, it is possible that the measure did not allow for a significant increase after Trial 2. Again, Figure 2 depicts the lack of improvement in the performance of the treatment groups from Trial 2 to Trial 3 or 4.

Relationship Between Variables

Correlations were computed between the dependent measures, the evaluation information from the trainees, and the trainee characteristics. Separate correlations were calculated for the control group. The two locations, northern and southern, were combined for these analyses.

For the experimental groups, the trials of the Question Generation Exercise became more stable with significant correlations between Trials 1 and 2 (r = .247; df = 68; $p < .05$), Trials 2 and 3 (r = .495; df = 68; $p < .001$), Trials 2 and 4 (r = .435; df = 68; $p < .001$), and Trials 3 and 4 (r = .599; df = 68; $p < .001$). The correlations are displayed in Table 15. The control group did not participate in

Table 15

The Northern and Southern Universities

Correlations for the Four Experimental Groups

	No. of Trainees	University	Trial 1	Trial 2	Trial 3	Trial 4	Inferring & Problem Solving	Appropriate	Appropriate to Inferring & Problem Solving
University	70								
Trial 1	70	-.036							
Trial 2	70	.208*	.247*						
Trial 3	70	.109	.107	.495****					
Trial 4	70	.003	.140	.435****	.599****				
Inferring & Problem Solving	66	.116	.088	.260*	.470****	.422****			
Appropriate Responses	66	-.185	-.064	-.038	.134	.095	.325***		
Appropriate to Inferring & Problem Solving	66	-.037	-.132	-.143	-.017	.069	-.080	.638****	

*$p < .05$
**$p < .01$
***$p < .005$
****$p < .001$

Trials 2 and 3 of the Question Generation Exercise. The correlation for the control group between Trials 1 and 4 was not significant (Table 16).

For the experimental groups, the correlations between the dependent variables of the Criterion Teaching Task are presented in Table 15. The proportion of inferring (In) and problem-solving (PS) questions asked correlated significantly with the proportion of appropriate (A) responses elicited from the pupils ($r = .325$; $df = 64$; $p < .005$). Although the proportion of In and PS questions did not correlate significantly with the proportion of A responses to In and PS questions, the A responses did correlate significantly with the A responses to In and PS questions ($r = .638$; $df = 64$; $p < .001$). Table 16 presents the control group correlations. For the control group, the only significant correlation between Criterion Teaching Task dependent variables was the proportion of appropriate responses to the proportion of A responses to In and PS questions ($r = .429$; $df = 15$; $p < .05$).

The only Criterion Teaching Task variable which correlated significantly with trials of the Question Generation Exercise was the proportion of inferring and problem-solving questions asked. For the experimental groups, the proportion of In and PS questions correlated significantly with Trial 2 ($r = .260$; $df = 64$; $p < .05$), with Trial 3 ($r = .470$; $df = 64$; $p < .001$), and with Trial 4 ($r = .422$; $df = 64$; $p < .001$). For the control group, the proportion of In and PS questions correlated significantly with Trial 4 ($r = .445$; $df = 15$; $p < .05$).

Table 16

The Northern and Southern Universities

Correlations for the Control Groups

	No. of Trainees	University	Trial 1	Trial 4	Inferring & Problem Solving	Appropriate	Appropriate to Inferring & Problem Solving
University							
Trial 1	18	-.007					
Trial 4	18	-.131	.378				
Inferring and Problem Solving	17	-.468*	.355	.445*			
Appropriate Responses	17	-.778****	-.258	.125	.342		
Appropriate to Inferring and Problem Solving	17	-.438*	.202	.341	.393	.429*	

*p < .05 ***p < .005
**p < .01 ****p < .001

The university setting was found to correlate for the experimental groups only with Trial 2 ($r = 208$; $df = 68$; $p < .05$). In contrast, the control groups were found to have significant correlations between the university at which the training occurred and the three dependent variables of the Criterion Teaching Task (*In* and *PS*: $r = -.468$; $df = 15$; $p < .05$. *A*: $r = -.778$; $df = 15$; $p < .001$. *A* to *In* and *PS*: $r = -.438$; $df = 15$; $p < .05$).

Simply by knowing the university attended by control group teacher trainees, one can predict approximately 60% of the variation in the proportion of appropriate responses trainees elicited from special class pupils, 20% of the variation in the proportion of inferring and problem-solving questions asked, and 20% of the variation in the proportion of appropriate responses to inferring and problem-solving questions.

Summary

The results of the data analysis indicated that the four experimental groups improved their questioning skills. The exception to that finding was the Criterion Teaching Task at the northern university. In comparing the two media of training materials presentation, the written materials were not significantly superior to the videotaped version on either dependent measure at either location. The activity of anticipating was not demonstrated to be more effective in changing trainees' questioning behaviors than the activity of coding, in fact, there was some evidence that coding was superior to anticipation.

The analyses of the Question Generation Exercise trials indicated that the Training Manual, which differentiated question and response categories, had a highly significant effect on the trainees' ability to generate inferring and problem-solving questions. Further examination of the trials failed to demonstrate a significant improvement in the trainees' questioning behavior after the activities of anticipating or coding the videotaped or written dialogues.

In addition, significant correlations within dependent measures and between dependent measures were presented in this chapter. High correlations for the control groups between the university setting and the dependent variables from the Criterion Teaching Task were also presented.

These results are interpreted and discussed in the following chapter.

CHAPTER VI

DISCUSSION

The objectives of the study were to develop a training module for improving the effectiveness of teachers' questioning of special education pupils and to evaluate the efficiency of alternative activities and media for teacher training.

The results presented in Chapter V indicated that the four training modules being compared improved trainees' questioning behaviors. Although the testing of the hypotheses failed to find significant differences in the predicted direction between the activities and the media employed in the four training modules, the data indicated that unhypothesized differences did exist. Much of the difference between the four experimental groups and the control group was due to the significant increase in trainees' generation of inferring and problem-solving questions immediately following the Training Manual's instruction in differentiating question and response categories. This chapter discusses these results and interprets them in reference to the literature relating to this investigation (see Table 17 for a summary of the results).

The Effectiveness of the Training Manual

The question categories taught by the Training Manual were adaptations of categories in the Individual Cognitive Demand Schedule (Lynch & Ames, 1972b) with the addition of the binary question category and pupil response categories. The need for teacher instruction in

Table 17

Summary of Results for the Testing of Each Hypothesis

Hypothesis	Question Generation Exercise		Criterion Teaching Task					
	A Northern Univ.	A Southern Univ.	A Northern University			A Southern University		
			Inferring & Problem Solving	Appropriate	Appropriate to Inferring and Problem Solving	Inferrring & Problem Solving	Appropriate	Appropriate to Inferring and Problem Solving
Hypothesis 1: Experimental < Control	S	S	NS	NS	NS	S	S	NS
Hypothesis 2: Written < Videotape	NS, NS	NS, NS	NS*	NS	NS	NS	NS	NS
Hypothesis 3: Code < Anticipation	NS*,NS*	NS, NS*	NS	NS	NS	NS	NS	NS
Hypothesis 4: Before Training Manual <After Training Manual	S	S						
Hypothesis 5: Before Training Dialogues <After Training Dialogues	NS	NS						

*Note: A large F was obtained. The result is not significant because the hypotheses predicted the opposite result.

question categories is evident from the overwhelming use of recall and binary questions in classrooms, and the confusion teachers have demonstrated in regard to the cognitive processes represented by the expected answer (Aschner, 1961; Crawford, King, Brophy, & Evertson, 1975; Gall, 1970; Sanders, 1972; Tinsley, 1968). Success in increasing teacher's production of high level questions has been obtained by the simple procedure of having teachers classify questions (Konetski, 1970; Wagner, 1973).

Two hypotheses predicted improved questioning skills for those trainees who received the Training Manual. Hypothesis 1 stated that, after the training, experimental groups would perform better than the control group, who did not receive the Training Manual or any other treatment. Hypothesis 4 stated that the four experimental groups would generate more high level questions as a result of the Training Manual's instruction in differentiation of question and response types. The partial support for Hypothesis 1 and the strong support for Hypothesis 4 substantiated the research indicating that the simple procedure of classifying questions is effective (Konetski, 1970; Wagner, 1973).

The simple training procedure of classifying questions provides the trainee with cue words to represent a category of similar behaviors. These cue words can then mediate in the retrieval and enactment of behaviors similar to those previously modeled (Bandura, 1969; Sheffield & Maccoby, 1961). The instructional dialogues written into the Training Manual for users to code can be considered models presented by the printed media. Peck and Tucker (1973) reviewed numerous studies in which coding systems, such as Flanders Interaction Analysis System (1962), successfully increased teachers' use of specific types of behaviors. Although Luebkemann (1966) found that merely learning a coding system was not as effective as direct, active attention to specific examples of behaviors, the Training Manual directed trainees' attention to printed examples and non-examples of behaviors to be modeled as an integral part of the instruction in a coding system.

The Training Manual's effectiveness is also congruent with the research suggesting that teachers do not understand the cognitive emphasis of the questions they ask (Tinsley, 1968). Sanders (1966) points out that questions beginning with "how" or "why" mislead teachers into believing they have asked a high level question when, in fact, the answer can be supplied entirely from memory. Simple instruction in the difference between memory questions and those requiring further cognitive activity appears sufficient for an increase in higher level questions asked by teachers.

A slightly different emphasis was tried by Lynch, Ames, Barger, Frazer, Hillman & Wisehart (1973). These researchers asked teachers to teach lessons with the objectives of recall or the objective of concept mastery. Examples of questions for each were given in the oral presentation of the objectives. The teachers' questions were found to be congruent with the assigned objectives. In the present investigation, the lesson objectives were stipulated in the instructions for the Question Generation Exercise. Teachers were asked to write inferring and problem-solving questions for a specific type of child.

Examples of inferring and problem-solving questions were not provided. The large increase in the number of such questions generated occurred in the comparison of the trial preceding the Training Manual with the trials following the Training Manual which did provide example questions. Evidently, important aspects of changing teachers' questioning behaviors include: (a) making explicit the objectives of the lesson in terms of pupils' cognitive activity and (b) providing examples of recall and non-recall questions.

The Effectiveness of the Treatments

The teacher-question and pupil-response categories taught by the Training Manual were employed in the training activities of coding or anticipating the written or videotaped dialogues. The written and videotaped dialogues simulated classroom teaching by focusing on the interaction between teacher and pupil. The teacher questions the pupil about a story that has just been read. The dialogues provided models of teachers asking a high proportion of inferring and problem-solving questions and obtaining a high proportion of appropriate responses from special class pupils. The training materials and activities were designed to give the trainees practice differentiating the pupils' responses according to whether or not the cognitive demands were met.

Hypothesis 5 stated that trainees would improve their scores in writing inferring and problem-solving questions as a result of anticipating or coding the teacher-pupil dialogues. This paper-and-pencil measure, i.e., the Question Generation Exercise, failed to demonstrate an increase in high level questioning following the training dialogues.

The fact that the method of measuring performance left little opportunity for change explains, at least in part, why no significant change occurred. In fact, the differences between treatment groups seemed to be caused by a differential loss in performance rather than by the improvement of performances.

Hypothesis 1 predicted that the treatment of the Training Manual and the training dialogues would be effective in changing trainees' questioning skills. Although the first hypothesis was, for the most part, supported, the data indicated that the Training Manual was responsible for the trainees' increased skills. The exception to the support of Hypothesis 1 occurred at the northern university on the Criterion Teaching Task. Here, the difference between the experimental groups and the control group was not significant. Consistent with this, and yet surprising, were the large correlations between the university setting and the control group's scores on the Criterion Teaching Task.

The difference between the universities was much greater for the control group than for the experimental groups and for the Criterion Teaching Task than for the Question Generation Exercise. Thus, the cause of the differences may be the different characteristics of the teacher trainees at the two settings, characteristics relevant to the Criterion Teaching Task. The Criterion Teaching Task involved pupils from special education classes. At the northern site, most of the teacher trainees knew the pupils from previous teaching experiences. Brophy and Good (1974) suggested that research has been successful in changing teachers' expectations only when teachers and pupils do not know each other and when teachers are not given sufficient time to form independent judgments of the pupils' abilities. Therefore, the differences in results between the two locations may be due to induced higher expectations toward the special education pupils of the experimental trainees at the southern site and reliance on previously formed expectations of both experimental and control trainees at the northern site.

Other researchers have noted the effects of established expectancies on the transfer of teacher skills to the teaching situation. Minskoff (1967) found that training designed to increase special education teachers' use of productive-thought questions failed. Minskoff stated that the teachers' limited educational goals for their students may have been responsible. In a study by Baum (1973), designed to improve teachers' expectations of their pupils, the teachers became more accurate predictors within a training game context. However, the teachers failed to anticipate the responses of children in their classrooms more accurately than teachers in the control group. The lack of effectiveness of training at the northern site, as well as in the research of Minskoff and Baum, could be due to the interference of teachers' past perceptions of the pupils.

Another factor that may have contributed to the effects of location is the number of hours of special education training. All teacher trainees at the northern university were majoring in special education; at the southern university, most trainees were taking their first course in special education. One study of teacher trainees' anticipations of pupils' abilities (Semmel, Garrett, Semmel, & Wilcove, 1973) obtained results which indicated that trainees can be oversensitized to the differences between special education and regular class children to such an extent that special education trainees underestimate the abilities of pupils in special education. The anticipations of trainees with a few courses in special education were as poor as those who had no training in the field. Because the lower means on the Criterion Teaching Task variables appeared in the data for the southern location control group, it is possible that the treatment corrected for the experimental groups' tendency to underestimate special class pupils. The treatment at the northern location, it would follow, was not effective because all trainees had less flexible, possibly more accurate, predictions for the behavior of special class pupils who participated in the Criterion Teaching Task. The week's training in questioning provided examples in which pupils in special education answered inferring and problem-solving questions appropriately. More than likely, this evidence of the abilities of special education pupils was insufficient to overcome expectations for specific pupils at the northern site.

The difference between the two settings in the results for the first two dependent variables of the Criterion Task may also be a function of the difference in the trainees' educational experiences. The more urban northern university students were more familiar with research, audio-video equipment, and different types of questions. The southern university students responded to the evaluation form in a much more positive fashion than did the students at the northern site. For example, the last question, which merely asked for further comments, elicited 32 positive comments and one negative comment at the southern site. The northern site wrote 24 positive and 39 negative comments. The investigator observed from the verbal comments made by the participants at the two settings that the format, materials, and context of the training were more novel for the trainees at the southern site than for those at the northern one. Although the novelty of an instructional media or procedure cannot be counted on to motivate learners and thus increase learning (Garrett & Wilcove, 1973; Levie, 1974), the novelty may have contributed to the success of training at the southern location.

The Comparison of Media

With the advent of simulation and microteaching, videotape equipment has been purchased and its use endorsed as an innovative approach for training teachers (Allen & Ryan, 1969; Borg et al., 1970; Manis, 1973; Peck & Tucker, 1973; Snow, 1969). Whether or not the novelty of videotape justifies the cost needs to be answered in terms of increased teacher effectiveness (Berliner & Codori, 1973; Gall, Dunning, Banks, & Galassi, 1972). A comparison of the media attributes of videotape with those of printed instructional materials points out the benefits of printed materials for ease in production and distribution (Stolovitch, 1975). Comparisons of the two media in terms of effectiveness have shown either no difference or a superiority of written versions over videotaped materials (Berliner & Codori, 1973; Gall et al., 1972; Koran, 1969). As an explanation for the relative success of written versions in her research, Gall suggested that written materials based on videotaped teacher-pupil behaviors reproduce more life-like behaviors than written materials used in the past.

Therefore, Hypothesis 3 predicted that the written materials would be more effective than the videotapes. The present study failed to replicate Gall's finding. Instead, the results from the Criterion Teaching Task at one of the two locations suggest that videotaped instructional materials may be more effective than written materials. The Question Generation Exercise did not indicate any difference between videotape and printed media. The Question Generation Exercise, a paper-and-pencil activity, more closely resembled the written materials. The Criterion Teaching Task replicated the interaction viewed by the videotape groups. Videotape may be a more effective medium for obtaining transfer to a similar live situation; if the instructional objective requires written reproduction of behaviors, either medium may suffice. Since transfer to the actual classroom is implicit in most instructional objectives for teacher training, the additional expense and production difficulties of videotape may be justified for some learners.

In the process of editing and duplicating the training materials, the difficulty of maintaining quality sound reproduction became evident. The teacher trainees evaluated picture quality more positively than sound quality, especially at the southern university. At both locations, the realism of the videotapes and written materials received a positive evaluation. The younger trainees judged the videotapes as more realistic than did the older trainees. Reaction to the pace of the videotapes varied considerably at both locations. For the written materials, of course, pace was self-determined. Although one might assume that videotapes capture the learners' interest more than written versions, teacher trainees at the northern site evaluated the written materials as more interesting. The southern site rated the interest level of both media higher than did the northern site. Teacher trainees at the southern site rated the videotape as more interesting than the written form.

Thus, the main advantage of videotaped instructional materials, in contrast to written materials, may be its transfer to similar real-life situations. The advantages of written materials are lower cost, relative ease of production, and self-pacing. The medium which creates more interest appears to vary with the background of the consumers. The novelty of videotapes may possibly determine interest level. Still, a high interest level does not necessarily lead to learning. If further research demonstrates that transfer of skills occurs more frequently as a function of videotaped instructional materials than as a function of written versions, videotapes would clearly be the preferred medium as long as costs are not prohibitive.

Comparison of Activities

Learning requires a certain amount of activity on the part of the learner. Although reading or viewing teacher-pupil dialogues suggests some active involvement, the challenge and cognitive processes involved are relatively low level. More importantly, the trainee may overlook that which has been incorporated in the material for the trainee to analyze or model. Cueing the learner and the learner's participation increases the probability that a behavior will be modeled (Bandura, 1969; Michael & Maccoby, 1961; Sheffield & Maccoby, 1961).

The two activities chosen to act as cueing procedures and to ensure the trainees' active involvement in the instructional materials were coding and anticipating. Research has demonstrated coding to be an effective activity for training teachers to emit specific behaviors (Peck & Tucker, 1973; Semmel & Sitko, in preparation). Luebkemann's (1966) evidence that direct, active attention to specific behaviors increases the modeling of behaviors more than simply learning to code suggests anticipation as a more powerful learning activity. Anticipation brings together the everyday process of expecting others to emit certain behaviors and the process of categorizing behaviors as they occur into predetermined classifications. Rather than coding a behavior after the fact, anticipation uses the codes to predict a type of behavior. Other research investigating anticipation has demonstrated this activity to be a skill that varies with the characteristics of those anticipating and those anticipated such that special education children are frequently incorrectly anticipated. Apparently, anticipation is a skill that special education teachers can improve (Baum, 1973). In the present study, anticipation is used both as a skill to be improved and a cueing procedure to activate and direct the learners' attention.

The third hypothesis predicted anticipation to be superior to coding as a training activity, regardless of the medium by which the instructional material was presented. Instead, the results indicated the opposite was true. Both dependent measures provide some evidence that trainees who participated in the activity of coding asked more inferring and problem-solving questions than trainees who anticipated. At the northern university, the difference between the anticipation and coding groups' means was consistently large for the proportion of inferring and problem-solving questions asked on both dependent measures. For the southern university, the difference in favor of coding was evident only on Trial 4 adjusted for Trial 2 of the Question Generation Exercise.

As in the pilot study, anticipating teachers' and pupils' interactive behaviors was not found to be an easy task. An examination of the means of the present study suggests that anticipating videotape is a more meaningful activity than anticipating written materials. The additional cues provided by seeing and hearing the teachers and pupils may be needed for anticipating to be an effective mode of training. The teachers' behaviors did not appear to follow logical patterns that could be deduced from observing the teacher-pupil interactions. The instructions to the teachers who were videotaped, as well as the editing of the videotapes, may have affected the logical sequencing of questions. Both teachers' and pupils' behaviors may be more erratic in videotaping situations.

It was intended that trainees become involved in the teachers' decision making so they would be aware of decisions in questioning, would compare some alternative types of questions, and would adapt questions to the pupils (see Morine, 1975). This attempt to force trainees' attention to the sequencing of questions possibly interfered with the cueing of specific types of questions. Not only must teachers know how to generate different question types--they also must know how to decide when to ask one kind or another (Shavelson, 1973). Future instruction in sequencing might successfully use coding for practice in differentiating question categories and anticipating for practice in analyzing teachers' sequencing decisions. Improved training dialogues to be anticipated could be obtained from recording the natural classroom interactions of effective teachers.

The Dependent Measures

The pilot study demonstrated the need for a second dependent measure and changes in the original Criterion Teaching Task in order to evaluate the training materials. The strength and limitations of each measure and the relation between the measures are discussed below.

Question Generation Exercise

The purpose of the Question Generation Exercise was to measure the change in trainees' abilities to write inferring and problem-solving questions as a function of the other training activities. This paper-and-pencil test acted as a pretest, a posttest, and a measure of learning between training activities. The exercise was inexpensive in terms of materials and personnel, was easy to administer, and consumed only 15 minutes per trial. The rank order of the trainees by scores had a greater tendency to remain the same in the later trials. Also, adjacent trials correlated higher with each other than with trials separated by more training activities.

Since all groups received the Question Generation Exercise as the entering evaluation of trainee ability to produce inferring and problem-solving questions, there was no way to examine the effect of Trial 1 on the effectiveness of the treatment. A pretest can interact with the treatment by setting the stage for training so that outcomes are different than in a nonexperimental situation where treatment is administered without pretesting (see Campbell & Stanley, 1963). Until further research shows otherwise, those trials of the Question Generation Exercise which occurred before a training activity should be considered a component of the training in terms of its effectiveness. It is reasonable to assume that the trials of the Question Generation Exercise occurring prior to the training activities increased the effectiveness of those activities, since the exercise created specific types of questions which the treatment then differentiated and illustrated through examples. Doubts in the minds of trainees regarding what to write on the first trial were resolved to some extent by the Training Manual so that a higher proportion of In and PS questions were written on the second trial. Therefore, the Question Generation Exercise functioned both as a dependent measure and as part of the training in questioning.

Criterion Teaching Task

The Criterion Teaching Task was designed to test the trainees' skill in asking higher cognitive demands and obtaining satisfactory responses from educationally handicapped pupils. The objective was to represent an actual teaching situation within limitations imposed for the sake of accurate data collection. The critical feature of the Criterion Teaching task was the inclusion of mildly educationally handicapped pupils. The presence of the pupils not only made the teachers' questioning tasks more relevant to classrooms' interactive instruction; it also allowed the appropriateness of pupils' responses to be used as an evaluation of the teachers' questioning. The reason for having appropriate responses as one of the teachers' objectives was to encourage the teachers to use pupils' responses to evaluate the questions generated.

In conjunction with these advantages of a dependent measure using pupils were certain disadvantages. In the pilot study, the significant difference among pupils for the number of appropriate responses obtained by trainees indicated that the differences among pupils contributed to the variance of scores within the treatment groups. Although the pilot indicated that pupils with similar abilities to answer questions should be chosen for the Criterion Teaching Task, such selection was deemed unfeasible. One of the difficulties in special education teacher training, as in research, is scheduling pupils for teaching encounters. Furthermore, restricting the variability within the pupil sample used for the Criterion

Teaching Task would have limited the generalizability of the findings based on the Task.

A further difficulty associated with the pupils was defining appropriateness of response. The measurement problem of ceiling effects would be avoided with more stringent definition and interpretation of what is reasonable, sufficient information, potentially correct and resulting from the cognitive activity requested. The proportion of appropriate responses and appropriate responses to inferring and problem-solving questions, as defined in this study, were very high. This may have interfered with the sensitivity of the measure to differences among the groups.

The correlation of the trainees' scores for appropriate (A) responses with those for appropriate responses to inferring (In) and problem-solving (PS) questions was significant for experimental groups and for control groups. This might have been expected, since these measures were not independent of each other. The proportion of In and PS questions was also related to the proportion of In and PS questions asked. For the experimental groups, these two variables did not show any evidence of linear relationship. For the control group, the correlation coefficient was larger but still not significant. For all groups, the correlation of In and PS questions with A responses was significant. These correlations indicated that trainees who used a large proportion of higher cognitive demands also obtained a large proportion of appropriate responses to their questions. Apparently, teachers can ask high level questions and continue to obtain correct responses. Somewhat surprising is the finding that those who asked mostly memory questions tended to get a smaller proportion of appropriate responses. Further investigations into the types of question that elicit appropriate responses would be enlightening, since it is usually assumed that lower level questions are easier to answer.

Changing the ratio of In and PS questions to low level questions did not change the proportion of A responses to In and PS questions. The quality of high level questions need not be traded for an increase in the quantity of such questions. Those who asked a large proportion of In and PS questions did not necessarily elicit a larger or smaller proportion of A responses to such questions. The high correlation between types of questions and types of responses suggests that those who elicited a high proportion of A responses tended to maintain a high proportion of A responses when asking In and PS questions. Yet this correlation between A responses and A to In and PS questions could instead be a function of the variation among educationally handicapped pupils' abilities to supply appropriate responses.

Even with the difficulties of defining and using appropriateness of pupils' responses as a measure of teachers' effectiveness in questioning, a significant difference was obtained with this dependent variable between the experimental and control trainees at the southern research site. With further refinement, appropriateness of response should prove to be a useful differentiation for evaluating questions. Such a measure would be a step toward using pupil achievement as the criterion for judging teacher effectiveness.

Relation Between the Dependent Measures

The Question Generation Exercise and the Criterion Teaching Task measured the trainees' generation of inferring and problem-solving questions. Only the Criterion Teaching Task measured the trainees' success at eliciting appropriate responses. Except for the first trial of the Exercise the two measures correlated in terms of types of questions asked. The quality of response obtained on the Criterion Teaching Task did not significantly correlate with the type of question written on the Question Generation Exercise. The variance of the third and fourth trials accounted for only about 20% of the variance of the In and PS questions asked during the Criterion Teaching Task. Clearly, the pencil-and-paper exercise cannot take the place of the teacher-pupil interaction task.

The trainees supplied a further reason for employing teaching encounters as a testing procedure. When asked what they like most, the teacher trainees most frequently referred to the Criterion Teaching Task (northern site: 28 out of 53; southern site: 25 out of 33). The aspect of the teaching task liked most by trainees was the interaction with children. Making arrangements in college communities for teacher trainees to interact with pupils usually requires cooperation from school officials, time, scheduling, transportation, etc. Also, there may be more trainees in special education than there are exceptional pupils available within the community. Nevertheless, such experiences appear to be important to the teacher trainee. Future investigations might determine how important the pupils' actual presence is in terms of the skills learned by the teacher trainee. Both microteaching and minicourses provide structured situations where trainees interact with children. This interaction aspect may be more central to trainees' success than has been recognized.

Summary

Evidence from two university settings demonstrated the abilities of teacher trainees to change their question generating behavior after spending only an hour learning to discriminate between types of questions. No evidence was obtained indicating the superiority of written medium over videotape for training teachers in a specific skill. Instead, videotape instruction may transfer better than written to interactive instructional situations. Comparisons of the questioning skills of those who anticipated with those who coded indicated that the activity of coding is more effective. This chapter also discussed the two dependent measures. It was concluded that the Question Generation Exercise functioned also as a treatment activity and that it cannot take the place of a teaching task in the evaluation of trainees' acquisition of questioning skills. The chapter which follows discusses the implications of the results. Attention is given to the way in which this study's results relate to issues in the training of special educators and what this study implies for future research.

CHAPTER VII

IMPLICATIONS

The previous chapter interpreted this study's results by discussing their relationship to the hypotheses and to research, theory, and conjecture in the field of special education teacher training. The present chapter focuses on the implications of these results for the field of special education teacher training and for future research on related issues.

Questioning

Question Categories

In the present study, written inferring and problem-solving questions were requested from the teacher trainees before they received any of the instructional activities. Although the instructions were explicit and the stories which preceded the questioning were written to stimulate inferring and problem-solving questions, fewer than half of the questions generated required cognitive activity beyond memory. This lends credence to the research which has found that approximately three-fourths of the questions asked by special education teachers require only recall or recognition (Lynch & Ames, 1970; Minskoff, 1967). Among the reasons previously proposed for this heavy reliance upon recall questions was the suggestion that teachers really do not understand the cognitive emphasis of the questions they generate (Tinsley, 1968). Therefore, a Training Manual was written to clarify differences among the question categories in the cognitive activity demanded from pupils.

Following this training, teachers demonstrated a large increase in their ability to produce inferring and problem-solving questions. Apparently, for teachers to be able to generate the questions they intend, types of questions should be defined according to the cognitive activity demanded from the pupil.

Pupils' Responses

Research literature in the field of special education contains evidence that teachers underestimate the cognitive abilities of pupils in special classes (Semmel, Garrett, Semmel, & Wilcove, 1973). Also, it has been postulated that special education teachers do not change their cognitive level of questioning if such a change contradicts their expectations of their pupils' abilities (Minskoff, 1967). For this reason, the training materials presented many instances in which pupils with educational handicaps responded appropriately to questions directed at different cognitive processes. This study was not designed to test the relationship of teachers' expectations to the types of questions asked handicapped pupils. Previous attempts to induce expecations have been successful when teachers were newly acquainted with the pupils and did not have time to form independent evaluations (Brophy & Good, 1974). In accordance with this generalization, a research project that was successful in making special education teachers more accurate in their anticipations of handicapped pupils in game setting failed to show a transfer when the teachers returned to their own classrooms and pupils (Baum, 1973). Nevertheless, the application of research on expectation to the production of teacher training materials would seem to have potential for increasing knowledge in both areas.

Only one study was discovered in the literature in which teachers' attention was directed to pupils' responses as a source of feedback and information to be used in deciding what type of question should follow (Taba, Levine, & Elzey, 1964). The present investigation took the use of pupils' responses one step further. Obtaining appropriate responses from the special class pupil was made one of the teachers' objectives during the Criterion Teaching Task. Appropriate responses became one of the dependent variables used to evaluate the teachers' questioning abilities. The rationale was that the ability to ask different types of questions means nothing unless most of the questions can be answered appropriately by the pupil being taught. Even though research evidence has suggested that more learning occurs when approximately 75% of the questions are answered correctly (Crawford, King, Brophy, & Evertson, 1975), the concern in special education is more apt to be whether or not the pupils will respond appropriately to any inferring or problem-solving questions. Thus the training was not designed to obtain a specific balance of easier questions with more difficult questions.

When the trainees demanded higher levels of cognitive activity, a large proportion of appropriate responses was obtained from pupils with educational handicaps. It appears that such children can experience success when asked to infer and solve problems. Because the rate of success was so high, it seems unlikely that this success can be attributed solely to the use of a broad definition of appropriateness. Appropriateness of the response seems to be a useful category system, even though it provided little evidence of differences between treatments in the present study. As suggested in the previous chapter, a narrower definition of what constitutes appropriateness should make the categories more sensitive indicators of differences among teachers in their questioning skills. In addition, a narrower definition should make the response categories more meaningful to teachers during the training activities.

Future investigations may wish to determine the importance of the pupils' actual presence in terms of the skills learned by teacher trainees. Both microteaching and minicourses provide structured situations where the trainee interacts with children. This interaction aspect may be more central to the success of these methods than has been recognized. Trainees in special education may be especially in need of opportunities to practice interactive skills in a controlled environment which includes a sample of the population of children they are being prepared to teach.

Modifying the Questioning Behavior of Special Education Trainees

Although many studies have been conducted in which teachers' questioning behaviors have changed as a result of various training procedures, such research has remained scarce in the field of special education. Investigations employing a Computer-Assisted Teacher Training System (CATTS) and microteaching or minicourses have provided evidence that teachers can increase their use of broad, higher cognitive level questions and decrease the frequency with which they ask binary or memory questions (Borg, Kelley, Langer, & Gall, 1970; Peck & Tucker, 1973; Schmitt, 1969; Semmel & Sitko, in preparation). The present investigation obtained modifications in trainees' questioning behaviors without the complexity and cost of such training procedures as CATTS or microteaching. This study provided further evidence that learning an observation system provides training in the discrimination of behaviors. This training is sufficient to demonstrate significant changes in teachers' behaviors if the criterion situation is a simulated or controlled setting and follows shortly after the training. Further investigation should focus on what produces long-term effectiveness and what must be included in the training to ensure the transfer of new skills to the classroom. A three-year follow-up study found significant differences between the control and experimental teachers for many of the behaviors taught by a minicourse (Borg, 1972). Minicourses, microteaching, CATTS, and the teaching task of the present study incorporate practice of the target behaviors in a controlled setting with pupils. Such practice surely facilitates the maintenance over time of behaviors the teachers are able to plan and produce after the discrimination training.

Instructional Media and Activities

Media of Presentation

This study's findings in regard to media of presentation supported the conclusions of many researchers and authors in the field of instructional development. For most instructional purposes, no differences exist between media in terms of their effectiveness. Media selection should be based on what is to be taught, who will be taught, and, especially, the situations in which the skills will be enacted.

The practical considerations of cost, production, and distribution problems are then used to make the final selection of media. In terms of effectiveness, future research should study the interaction of media attributes with variables such as learner characteristics, instructional content, and the criterion performance situation.

Instructional Cueing Activity

Two different fields of research have provided a rationale for the use of coding as a cueing activity: (1) the importance of cueing activities in modeling research (Bandura, 1969; Michael & Maccoby, 1961; Sheffield & Maccoby, 1961), and (2) the success of instruction in coding systems in teacher training research (Flanders, 1962; Peck & Tucker, 1973; Semmel & Thiagarajan, 1973). The present investigation found the Training Manual's instruction in coding to be an effective teacher training method. Furthermore, coding seemed to be more effective than the activity of anticipating. Anticipation was expected to focus the learner's attention on both the specific behaviors to be reproduced and the sequencing of interactive behaviors. This attention to the type of question that followed a particular type of response was designed so teachers would learn how to generate certain types of questions and how to decide when to ask one type of question or another (see Shavelson, 1973). Anticipation would probably be effective in helping teachers learn how to sequence questions if teachers were explicitly informed about the purpose of the activity and if effectiveness were measured in terms of differences in sequencing.

Future instruction in sequencing might successfully use coding for practice in differentiating question categories and anticipation for practice in analyzing teachers' sequencing decisions. Improved training dialogues to be anticipated could be obtained from recording the natural classroom interactions of effective teachers.

Performance-Based Teacher Education

Training Modules

For teacher education to be performance-based, alternative methods of training teachers must be developed and validated. An alternative frequently advocated is the use of training modules (Elam, 1971; Thiagarajan, Semmel, & Semmel, 1974).

In general, the most efficient training module of those compared in the present study was the coding of written materials. The least effective training module was anticipating written materials. The preference for the module in which the trainees coded written materials is due to the ease and low cost of production and distribution, since no one module was shown to be significantly more effective than the other combinations of media and activities.

Rather than finding one module superior to the others, the present investigation found a brief, self-instructional training manual to be the most effective training activity.

Model for Training Teachers

The development and evaluation of the teacher training modules responded to the need for alternative training programs which meet the criteria of performance-based teacher education (PBTE). The activities within the modules followed a model which incorporates the training attributes of interaction analysis systems and is designed to improve the training of special education teachers (Semmel & Thiagarajan, 1973). According to this model, skill in discrimination is a logical prerequisite to skill in generating behaviors, which, in turn, precedes the evaluation of those behaviors. Yet the trainees were administered a paper-and-pencil exercise in which they generated inferring and problem-solving questions before instruction in discriminating question and response categories. A question for a follow-up study is whether or not the effectiveness of discrimination training as provided by the Training Manual is dependent on having teachers attempt to generate specific types of questions before the discrimination training. In the present study, trainees were instructed to ask questions that would elicit appropriate responses. The assumption was that teacher trainees would then be using the appropriateness of pupils' responses to evaluate their questions. Perhaps this strategy in which teachers evaluate and select behaviors based on pupils' responses could, if taught explicitly, be demonstrated to be effective.

The premise underlying the teacher training model is that having trainees learn to discriminate, generate, and evaluate behaviors will facilitate individualization of instruction. Special education teachers in particular need such skills because of the variety of educational problems with which they must work. An unanswered question relating to the teachers' ability to individualize instruction is whether teachers can differentiate among pupils and match the pupils' abilities and knowledge with a type of question.

Components of Performance-Based Teacher Education

One of the basic components of PBTE is the teaching of behaviors, skills, or knowledge that have been demonstrated to enhance pupil growth (Elam, 1971). Applied to teachers' questioning, PBTE asks whether, as has been assumed, certain categories of questions produce certain types of learning. The difficulty no longer lies in preparing teachers to produce specific types of questions, but rather in devising sensitive measures for evaluating the impact of teacher's questioning behaviors on the pupil's response behavior.

Teachers in special education classes ask too few inferring and problem-solving questions to be able to evaluate pupil achievement as a function of types of questions asked. As training paradigms are strengthened with question generation and evaluation training conducted in controlled and natural teaching situations, the frequency of higher cognitive demands should increase.

The next objective of research in questioning for the field of special education teacher training should be the measurement of pupil achievement as a result of different types of questions asked and, equally important, as a result of different question sequencing strategies. Only then can be settled the issue of what question categories and strategies should be taught.

External Validity of Modules

Limitations on the generalizability of the results have been previously presented in terms of the areas which need further investigation. One of the strengths of the present study was that the data were collected at two teacher training institutions, thus increasing external validity. Not all of the significant results were obtained at both locations, which suggests that teacher research should be conducted at more than one university setting. A further advantage of conducting teacher training studies at more than one location is that failure to replicate can indicate which learner characteristics are prerequisites for behavior changes. Thus, future research evaluating training modules or other methods of providing performance-based training of special or regular class teachers should be validated in different teacher training settings. Special attention needs to be given to the interaction between trainee characteristics and the effectiveness of training to establish the parameters within which the training may be effective.

Summary

Although training in discrimination between question and response categories was highly effective in preparing special education teacher trainees to generate specific types of questions, many issues remain unresolved. For efficient training programs, knowledge must be obtained about these aspects of training necessary for long-term effects to be displayed in classroom settings. Once teacher behaviors are present in the classroom, the effect of those behaviors on pupils' progress must be discovered. As teacher training modules and procedures are developed to teach the skills which enhance pupil growth, they need to be evaluated in different settings with different groups of trainees. Only then does the teacher trainer have sufficient information to decide whether the module or program should be made available to those s/he is responsible for instructing.

The above chapter related the results of the study to broader issues of research on questioning in special education teacher training. The next chapter summarizes the preceding research report.

CHAPTER VIII

SUMMARY

The primary purpose of this study was to develop and validate a module for modifying special education teacher trainees' questioning skills. The questioning skills to be acquired by the trainees were the generation of inferring and problem-solving questions and the elicitation of appropriate responses from mildly educationally handicapped pupils. The components of the four training modules were a self-instructional manual which discriminated among question and response categories, the printed medium versus videotape for presentation of teacher-pupil dialogues, and anticipation versus coding for cueing the behaviors to be modeled from the instructional dialogues.

Teacher trainees who received the training modules were hypothesized to exceed those without the training in questioning skills. Anticipation was predicted to be a more effective training activity than coding teacher-pupil dialogues; the written materials were expected to be a more efficient training medium than the videotapes. It was also hypothesized that teacher trainees would improve in their ability to generate questions as a result of the training in discriminating categories of questions and responses provided by the self-instructional Training Manual. In addition, trainees were expected to demonstrate further gains in the proportion of high level cognitive demands they generated following the treatment of anticipating or coding videotaped or written dialogues.

The results of a pilot study involving 30 special education teacher trainees provided a basis for revision and additions to the instructional materials, research design, and training procedures. The hypotheses were then tested at two teacher training institutions, a northern and a southern university. College students (northern: N = 50; southern: N = 38) enrolled in special education courses participated in a week of training activities. The trainees' acquisition of questioning skills was evaluated by a repeated measure of question generation and a tutorial teaching task.

Trainees who received the treatment generated a greater proportion of inferring and problem-solving questions than those without the training activities. The experimental trainees also asked a greater proportion of higher level cognitive demands and elicited a larger proportion of appropriate responses on the teaching task at the southern university, but this finding was not replicated at the northern university. This failure to replicate was interpreted as suggesting an interaction between learner characteristics and the effectiveness of the treatment. A high correlation of university setting with the performance of the control groups on the teaching task provides support for this interpretation.

The results of the media comparison supported the "no difference" conclusion reached recently in the field of instructional development. Written materials were not shown to be more effective than videotapes, although, on the criterion teaching task at the northern site, there was a tendency for videotape groups to perform better than the written groups.

The more difficult activity of anticipation was predicted to be more effective, but the simpler activity of coding the teacher-pupil dialogues was found to be just as effective and possibly more effective in preparing special education trainees to ask non-recall questions.

The comparison of trials on the repeated measure indicated that the Training Manual's brief instruction in discriminating questions and responses was a very effective method for increasing the proportion of inferring and problem-solving questions the trainees generated. A comparison of the trials before and after the anticipation or coding of the written or videotaped dialogues failed to show an increase in the trainees' questioning skills.

The teaching task measured different aspects of the trainees' questioning skills from those measured by the paper-and-pencil repeated measure. Thus it was concluded that the generation of questions in a paper-and-pencil exercise was not a suitable replacement for the teaching task as the criterion dependent measure. The correlations among the question and response dependent variables from the criterion teaching task indicated that trainees who asked a large proportion of inferring and problem-solving questions also elicited a large proportion of appropriate responses. Also, those who asked special class pupils a large proportion of inferring and problem-solving questions did not necessarily elicit a larger or smaller proportion of appropriate responses to such questions. The high correlation between types of questions and types of responses suggested that those who elicited a high proportion of appropriate responses tended to maintain a high proportion of appropriate responses when asking inferring and problem-solving questions. Therefore, this investigation provided evidence that special education teachers can generate higher level cognitive demands and obtain appropriate responses from pupils with educational handicaps.

In conclusion, the effectiveness of discrimination training was supported. The activity of coding appeared to be equivalent or superior to anticipation, and written materials were not more effective than the videotaped dialogues. Future research is advised to investigate the interaction of media attributes with variables such as learner familiarity with the media and the criterion settings in which the modeled behavior is to be reproduced. With further revision of the categories, appropriateness of pupils' responses could be used to study question sequencing strategies. Research is needed to determine which types of questions and what method of sequencing questions produce the greatest increment in pupil growth. In order to study the effect of different questions and question strategies in the natural setting, transfer of teachers' questioning skills from the training situation to classroom interaction must first be accomplished and validated.

The results of the present investigation substantiated the need for replication of results in teacher education research. A better basis for generalizing from the setting and population of the investigation to other teacher training institutions is available for those results obtained at more than one location.

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APPENDIX A

An Evaluation of Modules Designed to Modify Teachers' Questioning of Special Education Pupils: A Pilot Study

An Evaluation of Modules Designed to Modify Teachers' Questioning of Special Education Pupils: A Pilot Study

A pilot investigation was conducted at an urban mid-western university. The reason for conducting the pilot was to evaluate the research design, the training materials, and the procedures used for training and for data collection. The question under investigation was which of the four training modules is most effective in improving teacher trainees' abilities to generate specific types of questions and elicit appropriate responses from special class pupils. The four training modules compared were anticipating videotape, coding videotape, anticipating written versions of the videotape, and coding the written versions.

Hypotheses

The hypotheses for the pilot study stated that teacher trainees who receive practice anticipating teachers' questions and pupils' responses improve their own questioning behaviors. It was predicted that the trainees would demonstrate more learning if the training utilized written dialogues than if videotaped materials were used. In addition, those trainees who were more accurate anticipators or coders during the training were expected to score higher on the Criterion Teaching Task than the less accurate anticipators and coders. High scores on the Criterion Teaching Task represented teacher trainees asking a large proportion of inferring and problem-solving questions and simultaneously eliciting a large proportion of appropriate responses from the pupils.

Hypothesis 1. Teacher trainees who anticipate teachers' questions and pupils' responses will score higher on the Criterion Teaching Task than teacher trainees who code teacher-pupil interaction.

Hypothesis 2. Teacher trainees who anticipate or code written versions of teacher-pupil interaction will score higher on the Criterion Teaching Task than teacher trainees who anticipate or code the videotape version of teacher-pupil interaction.

Hypothesis 3. Teacher trainees who are more accurate anticipators during the treatment will score higher on the Criterion Teaching Task than those who are less accurate anticipators.

Hypothesis 4. Teacher trainees who are more accurate coders during the treatment will score higher in their questioning skills than those who are less accurate coders.

Method

Subjects

Of the 50 teacher trainees from special education courses who began the training, 30 completed the week's activities. Table 18 displays the distribution of trainee characteristics.

On the last two days of the week, eight pupils from an intermediate special education class participated in the Criterion Teaching Task, the dependent measure of the teacher trainees' questioning skills.

Instruments and Materials

The instructional materials used in the pilot study are described below according to the treatment groups in which they appeared. The dependent measures and other handouts are described separately.

Group which anticipated videotapes (G_{AV}).

1. Training Manual: Three of the question categories from the Individual Cognitive Demand Schedule (Lynch & Ames, 1971) were defined in the Training Manual. The three categories were remembering, inferring, and problem solving. In addition, three categories of pupil responses were described: appropriate, inappropriate, and no response. The manual

Table 18

Distribution of Trainee Characteristics of the Pilot Study

	N
Age:	
20-21	5
22-23	3
24-25	11
26-27	2
28-29	4
30+	5
	30
Sex:	
Male	15
Female	15
Class:	
Junior	2
Senior	9
Graduate	19
Major:	
Special Education	26
Education	1
Other	3
Experience:	
No experience	15
Experience	15

also consisted of exercises in coding examples and non-examples of the categories.

2. Videotapes: Each of the three videotape segments presented one teacher and one pupil, a different teacher and pupil per segment. Experienced special education teachers asked special class pupils questions based on one of two short stories, Sammy the Squirrel or Munk the Chipmunk. The teachers read a story to a pupil, and were videotaped while asking the pupil questions. After a short break, the other story was read and the interaction videotaped. The teachers' objective in the lesson was to increase the inferring and problem-solving abilities of the pupils. The videotapes were edited to incorporate pauses between questions, responses, and the next question. Also, questions other than recall, inferring, or problem solving were eliminated, along with the responses to such questions.

3. Anticipation Booklets: The teacher trainees predicted from three options printed in Anticipation Booklets what would be said next by either the teacher or the pupil. The three booklets were designed to be used with the videotapes. The anticipations were made during the pauses in the videotapes. Each of the three segments was presented in a separate booklet constructed of 4 by 5 inch cards joined in the left hand corner by a ring.

4. Coding Booklets: Anticipations were recorded in Coding Booklets composed of six coding sheets, two per videotape segment, one per story. All sheets had one box for each interaction. Each box had squares labeled for each question and response category.

Group which coded videotapes (G_{CV}).

1. Training Manual. Three of the question categories from the Individual Cognitive Demand Schedule (Lynch & Ames, 1971b) were defined in the Training Manual. The three categories were remembering, inferring, and problem solving. In addition, three categories of pupil responses were described: appropriate, inappropriate, and no response. The manual also consisted of exercises in coding examples and non-examples of the categories.

2. Videotapes. Each of the three videotape segments presented one teacher and one pupil, a different teacher and pupil per segment. Experienced special education teachers asked special class pupils questions based on one of two short stories, Sammy the Squirrel or Munk the Chipmunk. The teachers read a story to a pupil, and were videotaped while asking the pupil questions. After a short break, the other story was read and the interaction videotaped. The teachers' objective in the lesson was to increase the inferring and problem-solving abilities of the pupils. The videotapes were edited to incorporate pauses between questions, responses, and the next question. Also questions other than recall, inferring, or problem solving were eliminated, along with the responses to such questions.

3. Coding Booklets: Anticipations were recorded in Coding Booklets composed of six coding sheets, two per videotape segment, one per story. All sheets had one box for each interaction. Each box had squares labeled for each question and response category.

4. Criterion Booklets: The trainees who coded videotapes received feedback on the accuracy of their codes by comparing them to the codes in the Criterion Booklet. The Criterion Booklet codes were the consensus of experienced coders.

Group which anticipated written (G_{AW}).

1. Training Manual: Three of the question categories from the Individual Cognitive Demand Schedule (Lynch & Ames, 1971b) were defined in the Training Manual. The three categories were remembering, inferring, and problem solving. In addition, three categories of pupil responses were described: appropriate, inappropriate, and no response. The manual also consisted of exercises in coding examples and non-examples of the categories.

2. Anticipation Booklets: The booklets devised for the anticipation of written materials contained the options for predicting teacher and pupil behaviors from the Anticipation Booklets used by G_{AV} plus the dialogue from the videotapes. A card with the pupil response from the videotaped dialogue on the top portion had on the lower portion of the card three possible teacher responses which represented recall, inferring, and problem-solving questions. The next card presented the actual question the teacher had asked.

3. Coding Booklet: Anticipations were recorded in Coding Booklets composed of six coding sheets, two per videotape segment, one per story. All sheets had one box for each interaction. Each box had squares labeled for each question and response category.

Group which coded written (G_{CW}).

1. Training Manual: Three of the question categories from the Individual Cognitive Demand Schedule (Lynch & Ames, 1971b) were defined in the Training Manual. The three categories were remembering, inferring, and problem solving. In addition, three categories of pupil responses were described: appropriate, inappropriate, and no response. The manual also consisted of exercises in coding examples and non-examples of the categories.

2. Transcripts: The Transcripts were written versions of the three videotape segments.

3. Coding Booklet: Anticipations were recorded in Coding Booklets composed of six coding sheets, two per videotape segment, one per story. All sheets had one box for each interaction. Each box had squares labeled for each question and response category.

4. Criterion Booklet: The trainees who coded videotapes received feedback on the accuracy of their codes by comparing them to the codes in the Criterion Booklet. The Criterion Booklet codes were the consensus of experienced coders.

Basic Materials.

1. Stories: Six stories were written to be of interest to children in intermediate special classes and to stimulate different levels of questions. The stories were similar in length and at the fourth grade reading level according to a readability formula (Dale & Chall, 1948). Two stories, Sammy the Squirrel and Munk the Chipmunk were used for the videotaped and written dialogues. The other four stories, Meek, the Homeless Field Mouse, Willy the Woodchuck, Max Mole, and Bobby Boxturtle,

were the lesson materials for the Criterion Teaching Task.

2. Instructions: The instructions to the trainees were distributed with the stories for the training activities and the Criterion Teaching Task.

3. Forms: Trainees completed a form which requested background information and one which asked for an evaluation of the training materials and procedures.

Criterion Teaching Task

The Criterion Teaching Task measured the teacher trainees' questioning skills. For the Criterion Task, each teacher received one of four stories. The trainees' were instructed to ask their pupils inferring and problem-solving questions and to elicit as many appropriate responses from their pupils as they could. The preparation period and teaching task were timed with stop watches. The teaching was audiotape recorded on Sony 800 B with internal microphones.

Procedure

The pilot study was conducted over a five day period. Table 19 depicts the training activities according to their time sequence. This section describes the stages of training and data collection according to that time frame.

Day One. All subjects were randomly assigned to one of the four groups: anticipating videotapes (G_{AV}), coding videotapes (G_{CV}), anticipating written (G_{AW}), or coding written (G_{CW}). After filling out a background information form, all trainees received the Training Manual which took approximately one hour to complete.

Day Two. On the second day, the trainees were assigned to four separate rooms to either anticipate videotapes, code videotapes, anticipate written materials, or code written materials. The anticipations

Table 19

Sequence of Treatment and Testing

(Pilot Study)

	Day One		Day Two	Day Three	Days Four & Five	
	Background Information Form	Training Manual	Treatment	Treatment	Criterion Teaching Task	Evaluation Form
Groups:						
Anticipating Videotape	X	X	Anticipating Videotapes 1 and 2 Part A	Anticipating Videotapes 2 Part B and 3	X	X
Coding Videotape	X	X	Coding Videotapes 1 and 2 Part A	Coding Videotapes 2 Part B and 3	X	X
Anticipating Written	X	X	Anticipating Written 1 and 2 Part A	Anticipating Written 2 Part B and 3	X	X
Coding Written	X	X	Coding Written 1 and 2 Part A	Coding Written 2 Part B and 3	X	X

and codes were recorded in the coding booklets. The first segment and the first half of the second segment of the videotapes or written version were completed. The videotape groups finished in an hour, but the subjects in the written groups finished in less than 45 minutes.

Day Three. The activities of the third day were the same as the second day, except that the anticipation and coding were of the second half of the teacher-pupil dialogues.

Days Four and Five. The trainees were scheduled for one hour on either the fourth and fifth day with, at most, four trainees, one from each group, scheduled per hour. Each trainee was given directions for the Criterion Task and one of the four stories. The stories were assigned to subject number so that each story appeared once but not more than twice in each group. Time was provided for the study of the directions and stories before the trainee met her/his pupil in a tutorial room. Each time a pupil was taught, s/he heard a different story and the trainee represented a different group. After becoming acquainted, the trainee read the story to the pupil and their questions and responses were audiotape recorded for eight minutes. After the Criterion Teaching Task, all trainees evaluated the week's activities on the form provided and in conversation with the experimenters. At this time the experimenters answered the participants questions concerning the training.

Analyses of Data

The first 20 of the teachers' questions and the pupils' responses during the Criterion Teaching Task were transcribed and coded according to the categories defined in the Training Manual. In addition, the scores representing the accuracy of trainees' anticipation or coding of the treatment dialogues were recorded.

The design was a 2 X 2 factorial. Analyses of variance were performed on the five dependent variables from the Criterion Teaching Task. Correlations were run on the accuracy of anticipating or coding during the treatment and the Criterion Teaching Task scores.

Results

Hypothesis 1

Those special education trainees who anticipated the videotape or written dialogues were expected to perform better in their questioning skills on the Criterion Teaching Task than the trainees who coded. The analysis of five dependent variables did not result in significant differences between anticipation and coding as training activities (Table 20 and 21).

Hypothesis 2

The trainees who read the written version were predicted to exceed those who viewed the videotape in their performance in asking inferring and problem-solving questions while eliciting appropriate responses from educationally handicapped students. Table 20 and 21 display the results which do not provide support for the hypothesis.

Hypothesis 3

The third hypothesis predicted that the teacher trainees who were better able to anticipate questions and responses during the training would generate more inferring and problem-solving questions and elicit more appropriate responses from the pupils during the Criterion Teaching Task than the less accurate anticipators. The correlation coefficient

Table 20

Analyses of Variance on the Criterion Teaching Task

(Pilot Study)

	Inferring Questions Asked by Trainees			Problem-Solving Questions Asked by Trainees			Appropriate Responses Elicited From Pupils			Inferring Questions Eliciting Appropriate Responses			Problem-Solving Questions Eliciting Appropriate Responses		
Source	df	MS	F	df	MS	F	df	MS	F	df	MS	F	df	MS	F
Between	3	11.83		3	.72		3	17.50		3	.93		3		
Media	1	.50	<1.0	1	2.07	<1.0	1	.01	<1.0	1	.47	<1.0	1	.21	<1.0
Activity	1	33.43	4.04	1	.07	<1.0	1	19.07	1.30	1	.47	<1.0	11	2.21	1.1
Media x Activity	1	1.55	<1.0	1	.02	<1.0	1	33.43	2.29	1	1.88	<1.0	1	.05	<1.0
Within	26	8.27		26	3.63		26	14.62		26	7.19		26	1.95	
Total	29	8.64		29	3.33		29	14.92		29	6.55		29	1.84	

Table 21

Means and Standard Deviations on

The Criterion Teaching Task

(Pilot Study)

Dependent Variables	Anticipate Videotape		Code Videotape		Anticipate Written		Code Written	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
Inferring Questions	6.625	2.722	8.286	3.729	6.429	3.101	9.000	1.773
Problem-Solving Questions	2.625	2.326	2.571	1.271	2.143	2.116	2.000	1.690
Appropriate Response	11.625	4.307	12.143	4.947	13.714	2.870	10.000	2.777
Appropriate to Inferring	4.250	2.252	5.000	3.786	5.000	2.769	4.750	1.669
Appropriate to Problem-Solving	1.375	1.303	2.000	1.000	1.286	1.704	1.750	1.488

between the accuracy of anticipation during the treatment and the number of appropriate responses obtained from the pupils provides evidence in support of this hypothesis ($r = .635$; $df = 13$; $p < .05$). No evidence was found that more accurate anticipators also generated more inferring and problem-solving questions (Table 22).

Hypothesis 4

The more accurate coders of the treatment dialogue were also expected to ask more high level questions eliciting appropriate responses during the Criterion Teaching Task than those who were less accurate coders. Except for the asking of problem-solving questions, the correlation coefficients between the teacher trainees' accuracy scores from the treatment and the dependent variables from the Criterion Teaching Task lend support to Hypothesis 4 (Inferring: $r = .729$; $df = 13$; $p < .01$. appropriate: $r = .544$; $df = 13$; $p < .05$). appropriate to inferring: $r = .636$; $df = 13$; $p < .05$). The correlations are presented in Table 22.

Pupils.

The eight children from intermediate special classes who were the pupils in the Criterion Teaching Task were expected to perform differently in the number of appropriate responses they gave. Therefore, each pupil was taught at least once, but not more than twice, within each treatment group. To determine if this procedure was necessary and to evaluate the possible effect of pupil differences on the teachers' questioning scores, analyses of variance were performed (Table 23). A significant difference between pupils was found for the number of

Table 22

Correlation Coefficients Between
Accuracy Scores and Criterion Teaching Task
(Pilot Study)

Criterion Teaching Task	Accuracy During Treatment	
	Anticipation	Coding
Inferring Questions	-.010	..729**
Problem-Solving Questions	-.023	.021
Appropriate Responses	.635*	.544*
Appropriate to Inferring	.264	.636*
Appropriate to Problem Solving	.421	.257

*p < .05
**p < .01

Table 23

Analyses of Variance of Pupils for the Criterion Teaching Task

(Pilot Study)

Dependent Variables	Source	df	MS	F
Inferring Questions Asked by Trainees	Groups Error Total	7 22 29	3.33 10.36 8.66	<1.0
Problem Solving Questions Asked by Trainees	Groups Error Total	7 22 29	3.86 3.17 3.33	1.22
Appropriate Responses From Pupils	Groups Error Total	7 22 29	35.73 8.30 14.92	4.30**
Inferring Questions Eliciting Appropriate Responses	Groups Error Total	7 22 29	10.85 5.18 6.55	2.09
Problem Solving Questions Eliciting Appropriate Responses	Groups Error Total	7 22 29	1.91 1.81 1.83	1.1

**$p < .01$

appropriate responses ($\underline{F}$ = 7.3; $\underline{df}$ = 4,22; $\underline{p} < .01$), but not for the number of high level questions asked or the number of appropriate responses to high level questions. The means presented in Table 24 . are based on two or one observations per pupil.

Stories

The four stories used as a basis for questioning in the Criterion Teaching Task were also suspected of contributing to differences within treatment groups. The results of the data analyses on the five dependent variables indicated that there were no significant differences among the stories (Tables 25 and 26).

Summary

The results of the data analyses did not show significant differences among the four training modules in the questioning skills of the teacher trainees as measured by the Criterion Teaching Task (Hypotheses 1 and 2). The positive correlations between the accuracy of anticipating or coding and the number of appropriate responses elicited suggested that those who were more accurate also did better at wording their questions so that the pupil could respond (Hypotheses 3 and 4). In general, those who coded accurately during the treatment also asked a large number of inferring questions. This correlational relationship did not occur for those who anticipated.

The analyses performed on the effects of the pupils and stories indicated that differences among the pupils affected the trainees' questioning only in terms of eliciting appropriate responses and that the stories did not have a significant effect on their questioning scores.

Table 24

Means and Standard Deviations on Pupils in the Criterion Teaching Task

(Pilot Study)

	Inferring	Problem Solving	Appropriate	Appropriate to Inferring	Appropriate to Problem Solving
Pupil					
1 Mean	8.500	3.750	12.250	6.000	2.500
SD	2.517	1.500	3.775	1.826	1.291
2 Mean	7.000	4.000	7.000	2.333	1.667
SD	5.291	1.000	2.646	2.082	2.082
3 Mean	6.000	1.750	12.500	3.500	1.500
SD	2.944	2.217	3.109	1.000	1.732
4 Mean	8.250	1.750	11.250	5.750	1.250
SD	3.304	1.500	3.594	2.986	0.957
5 Mean	7.333	1.333	10.333	4.000	0.333
SD	3.786	1.527	1.527	3.000	0.577
6 Mean	7.750	2.500	15.000	5.750	2.500
SD	1.708	1.000	2.449	0.957	1.000
7 Mean	8.750	2.500	16.250	7.000	1.750
SD	4.272	3.109	2.217	3.651	1.708
8 Mean	7.000	1.250	8.250	2.750	1.000
SD	0.817	0.957	2.630	1.258	0.817

Table 25

Analyses of Variance on Stories in the Criterion Teaching Task

(Pilot Study)

Dependent Variable	Source	df	MS	F
Inferring Questions Asked by Trainees	Groups Error Total	3 26 29	.99 9.55 8.66	<1.0
Problem Solving Questions Asked by Trainees	Groups Error Total	3 26 29	5.79 3.05 3.33	1.90
Appropriate Responses From Pupils	Groups Error Total	3 26 29	6.17 15.93 14.92	<1.0
Inferring Questions Eliciting Appropriate Responses	Groups Error Total	3 26 29	3.00 6.96 6.55	<1.0
Problem Solving Questions Eliciting	Groups Error Total	3 26 29	.72 1.96 1.83	<1.0

Table 26

Means and Standard Deviations on Stories in the Criterion Teaching Task

(Pilot Study)

Dependent Variables:	1 Mean	SD	2 Mean	SD	3 Mean	SD	4 Mean	SD
Inferring	7.375	3.335	7.286	3.861	7.125	2.031	8.000	3.055
Problem Solving	2.750	1.669	3.250	2.315	1.857	1.773	1.286	0.756
Appropriate	12.000	4.811	12.125	4.549	12.571	2.573	10.429	3.359
A to In	5.500	3.338	4.500	2.268	4.857	1.952	4.000	2.708
A to PS	1.875	1.246	1.625	1.685	2.286	2.059	1.143	0.690

Discussion

This pilot study was conducted to evaluate the research design, the materials, and the procedures for testing the hypotheses. The hypotheses were concerned with the best components for a module designed to improve teacher trainees' questioning skills. The data analyses, evaluative reports from the trainees, and the impressions of the investigator indicated revisions needed in the training materials and the design of the study.

Hypothesis 1 had predicted that anticipation would be a superior training activity to that of coding. Hypothesis 2 predicted that the written media would be superior to videotape for presenting the training. Neither hypothesis received support from the analysis of the Criterion Teaching Task data. Yet the verbal reports of the participants indicated that learning had occurred. It seems most probable that the lack of differential learning was due to weakness of treatment, problems with the content of the materials, and confusion in the procedure.

Modification Design and Dependent Variables

If the pilot investigation had included a control group for the effects of the training manual and the four treatments, it would have been possible to obtain evidence of whether or not all experimental groups improved in their questioning skills. A repeated measure which could be used as a pretest, process test, and posttest would have assisted in determining which of the training activities were responsible for the improvement in questioning skills.

Modifications to improve the Criterion Teaching Task's sensitivity to difference in questioning skills were also indicated. The finding that some teachers started with recall questions and had just begun to ask problem-solving questions at the cut-off point of 20 questions suggested using a time limit rather than limiting the number of questions. This could be accomplished by using the proportion of a type of question or response given to the total number of questions or responses for that subject as the dependent variable. Also, pilot trainees suggested more time should have been allowed for the trainee and pupil to become acquainted before the questioning. Even though the results of the data analyses failed to demonstrate differences due to the stories used in the Criterion Teaching Task, criticism of two of the stories by the trainees suggested that the stories should be rewritten or replaced.

Modifications of Materials and Procedures

The anticipation and coding accuracy scores from the treatment dialogues provided some evidence that the more accurate trainees also scored higher in questioning skills on the Criterion Teaching Task (Hypotheses 2 and 3). More important for the purpose of evaluating the procedures and materials, the accuracy scores suggested that the coding activity was a much easier task (mean number of coding errors: videotape = 37.4, written = 27.6; mean number of anticipation errors: videotape = 102.7; written = 102). Two ways it was thought the anticipation task could be improved were clarifications of the instructions and more continuity in the dialogues.

The questions voiced by the participants at the conclusion of the pilot training and testing activities made evident the need for both clarification of the instructions and, in the beginning, an overview of the week's activities and their purpose. An overview indicating the purpose would be especially helpful to those asked to undertake the more difficult task of anticipating.

The activity of anticipation would have been a much easier task if the editing of the videotapes had not so greatly interfered with the continuity of the dialogue. A loss of realism from extensive editing resulted in dialogue which appeared irrelevant to actual classroom instruction. The evaluations from the trainees were more critical of the poor sound quality of the videotapes than any other aspect of the study. Another limitation was that the videotapes presented too many examples of recall and too few problem-solving questions. The lack of examples of problem-solving questions was reflected in the low number asked during the Criterion Teaching Task. Improving the quality and the content of the videotapes would, in turn, improve the written version which is based on the videotapes. Of course, the activities of anticipation and coding the dialogue presented by either medium also would be improved by the above modifications to the videotapes.

Further revision was also indicated for the Training Manual. Many of the teachers' questions during the Criterion Teaching Task were binary. Although such questions seemed to call for inference, the pupil needed to answer only with a yes or no. In such cases, no evidence of inferential thinking was available. Therefore, binary questions were differentiated from recall, inferring, or problem-solving questions in the investigation which followed the pilot study.

Summary

The pilot investigation was conducted to evaluate the research design, materials, and procedures for testing teacher training modules on questioning skills. The results from 30 college students in special education who participated in one of four training groups failed to demonstrate any differences among the training modules in their effect on a criterion measure. The criterion measure was a teaching task in which trainees were to ask pupils with educational handicaps, inferring and problem-solving questions sequenced and worded so that appropriate responses were elicited. The formal and informal evaluation information provided a basis for changing the research design, revising the printed and videotaped materials, and modifying the training and data collection procedures for the study which followed.

APPENDIX B

Illustrations of the Four Training Modules

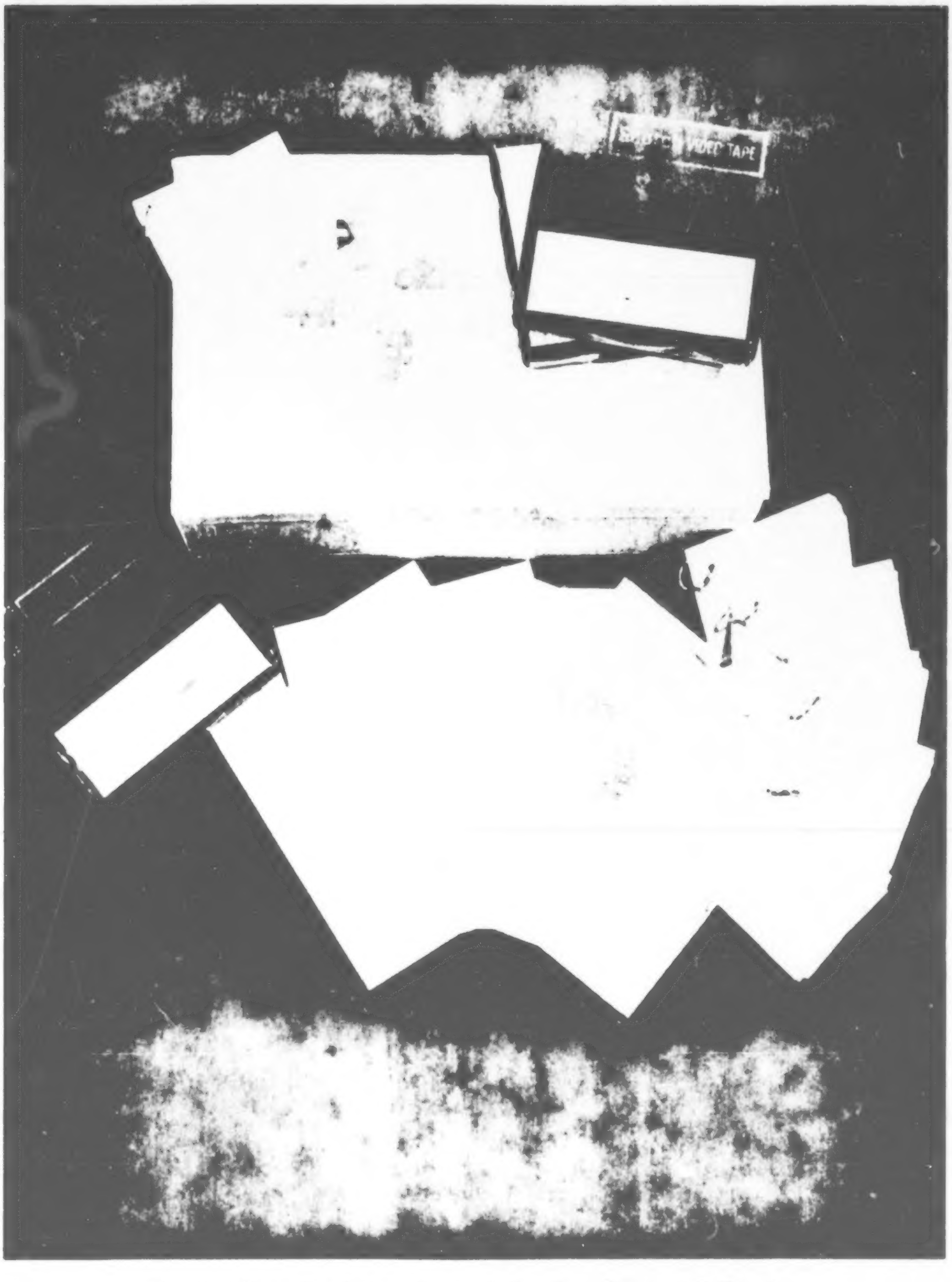


Figure 5 . Training Materials for Improved Teacher Questioning: Anticipating Videotapes

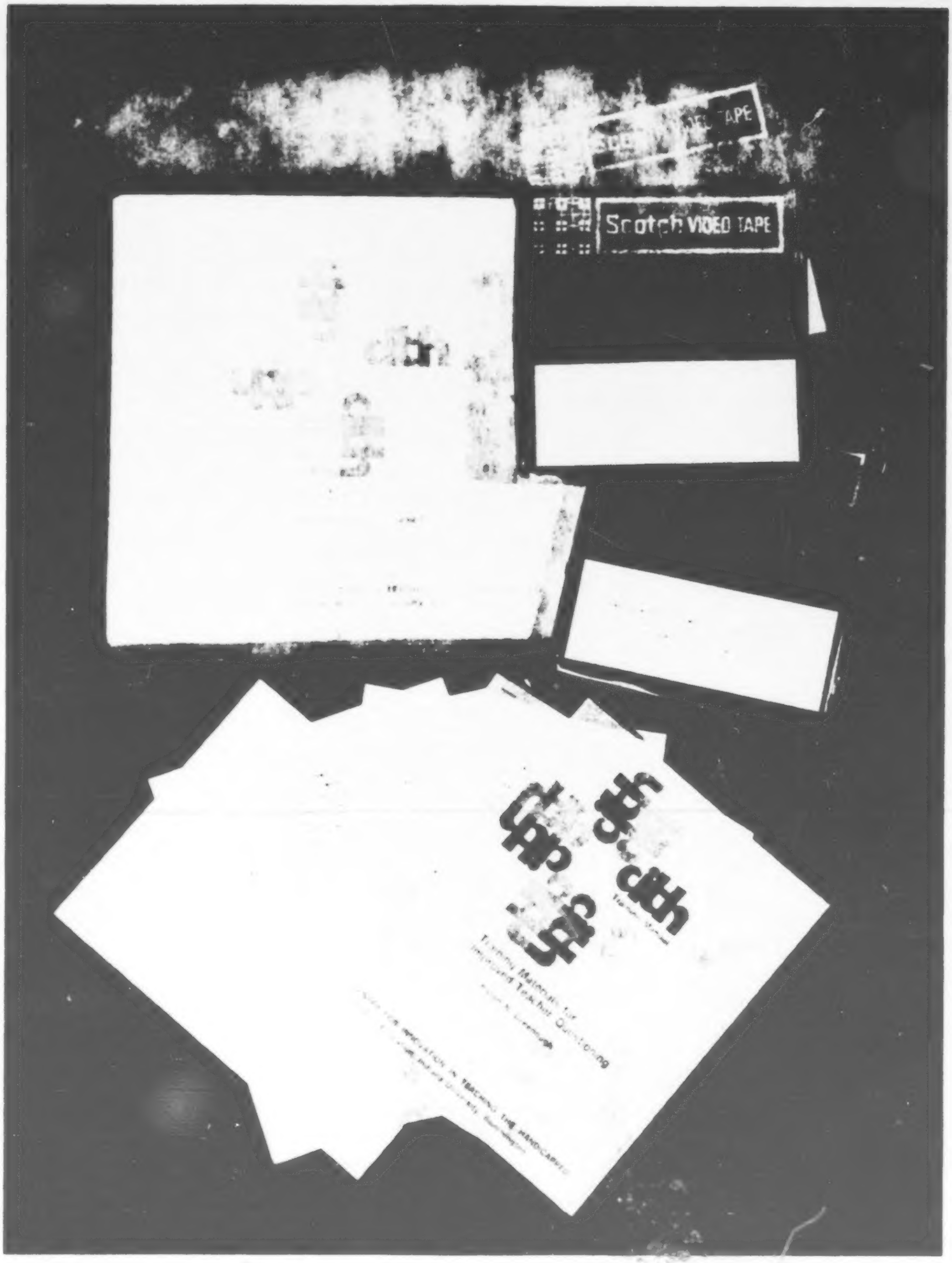


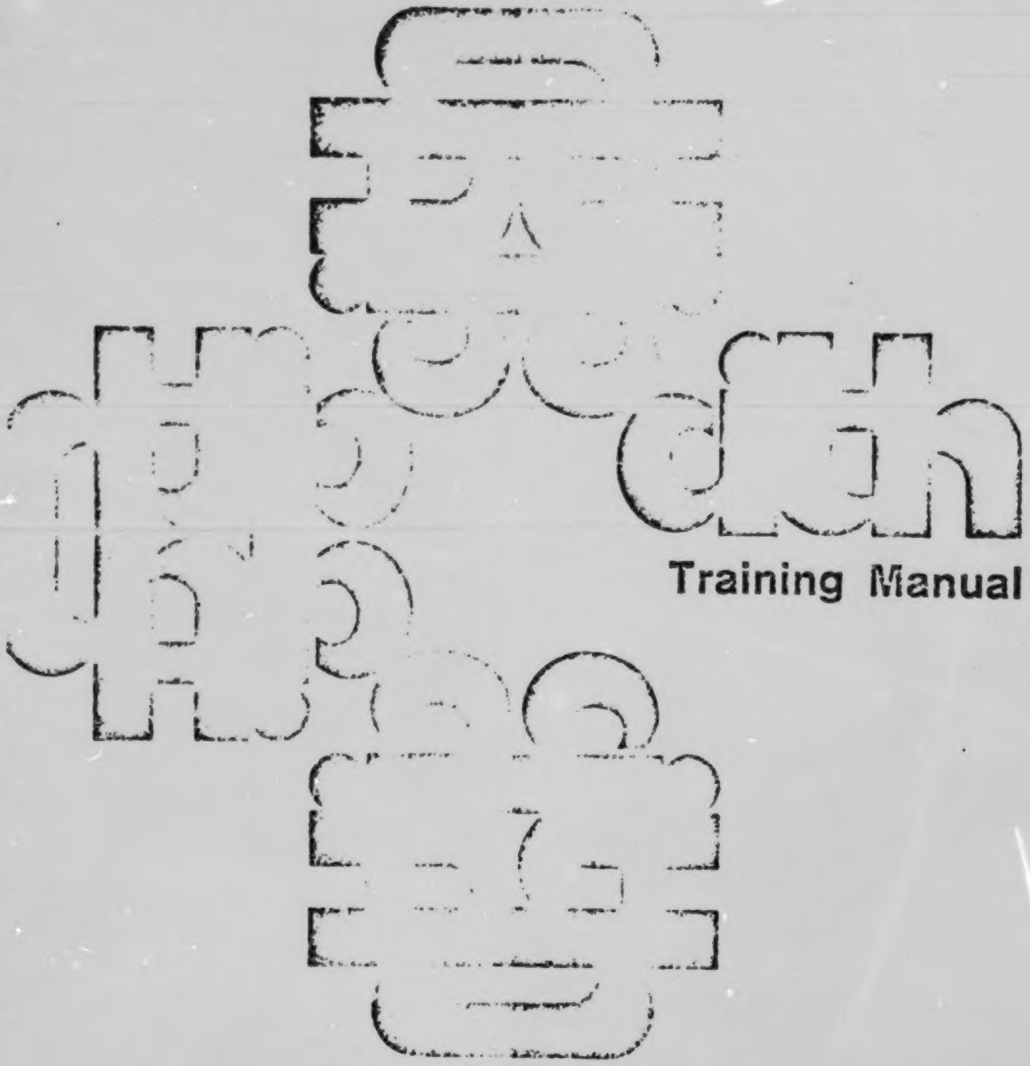
Figure 6. Training Materials for Improved Teacher Questioning: Coding Videotapes

Figure 7. Training Materials for Improved Teacher Questioning: Anticipating Written Materials

Figure 8 . Training Materials for Improved Teacher Questioning: Coding Written Materials

APPENDIX C

The Training Manual



Training Manual

Training Materials for Improved Teacher Questioning

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TRAINING MATERIALS FOR IMPROVED TEACHER QUESTIONING[1]

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Acknowledgment

The sections defining Recall, Inferring, and Problem Solving questions (pages 3 through 12) are adapted from the training manual for the Individual Cognitive Demand Schedule by W. W. Lynch, Jr. and Carole Ames (1972).

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Introduction

Most teachers in elementary classrooms ask a great number of recall questions, but very few inferring questions. The number of problem solving questions asked by elementary school teachers is extremely low. When teachers ask inferring and problem solving types of questions, they stimulate such cognitive activities as divergent thinking or manipulation and elaboration of information. The ultimate objective of this instructional program is to improve skills in generating inferring and problem solving questions in actual classroom discussions.

Questions are asked by teachers in order to elicit certain types of responses. The questions dictate cognitive tasks which the pupils must perform in order to answer the questions appropriately. Teacher evaluations of pupils' responses can assist the teacher in generating and sequencing his questions. Therefore this program describes three teacher question categories--Remembering, Inferring, and Problem Solving--and describes three pupil response categories: Appropriate, Inappropriate, and No Response.

One hour should be sufficient time to finish the manual. Record your responses according to the directions preceding each activity. The correct responses will be found in the confirmation booklet which accompanies this manual. As you read through the manual, note especially the way in which one should word a question so that it asks the pupil to make an inference or solve a problem.

Binary Questions

Questions which can be answered "yes" or "no" are often referred to as binary questions. What would be a concise yet appropriate response to all of the following questions?

1. Have you ever had a bike?
2. Do you know how you would feel if you lost your bike?
3. Do you remember what kind of bike the story was about?
4. Can you ride a bike?
5. Will the girl return the bike?
6. Could you tell me what you would do if your bike was missing?

The above are all binary questions and could be answered either "yes" or "no." Teachers often ask binary questions. When answering the question, the pupil is not required to perform the specific cognitive activities intended. For example, if a teacher asks the last question listed above, the teacher probably wants the pupil to say what might be done to solve the problem. Yet the pupil may respond "yes" or "no." The teacher learns very little about the pupil's knowledge or cognitive ability from that response. For this reason, binary questions are not categorized as Recall, Inferring, or Problem Solving in this manual.

I. Check the following questions which are worded so that they can be answered with a "yes" or "no" response.

_____A. Can you tell me what the name of the story was?

_____B. What did the girl like to do best?

_____C. Do you remember what she did next?

_____D. What would you have done if you had been the girl in the story?

_____E. Do you think her parents were worried?

Re: Remember What Happened in the Story

Teacher: Greg, what was the story about?

Greg: It's a story about a dumb dog called Flip. He belonged to Mary and George. One day Flip went to school with them and the teacher didn't see him at first.

Teacher: What was the teacher's name? Mona?

Mona: I don't know.

Teacher: Her name is Mrs. Frick. Buddy, what happened next?

Buddy: When the teacher saw the dog in the classroom, she was surprised. She chased him out.

Teacher: Andy, you have a dog. Please tell us about your dog.

All cognitive demands in the preceding dialogue belong to the category called Remembering (Re). Which of the following statements are true of Remembering questions?

II. _____A. The child can respond correctly merely by reporting what he presently sees, hears, or feels.

_____B. The child provides information from past experience without any cognitive activity beyond memory.

_____C. The child has to transform the information in some way, rather than just reporting what is already known by the child.

Some other types of questions also involve an element of Remembering. The major difference between these categories and Remembering is that Remembering involves mere recall and reproduction (or summarizing) of information. Other types of cognitive demands, such as the following, require the child to rearrange or elaborate on the information or to make inferences from it.

Teacher: How are these two words alike in meaning?
Judy: They both express a positive emotion.
Teacher: How would you describe an opposite emotion?
Phil: Anger.
Teacher: If you want to know what someone else is feeling, how can you tell without asking?

In the following cognitive demands, the important cues are presented visually or auditorily to the child.

Teacher: I have drawn a triangle on the board. John, how is triangle spelled?
John: Triangle. T-r-i-a-n-g-l-e.
Teacher: Judy, describe the triangle. What do you see?
Judy: It has three sides and three corners.
Teacher: I have drawn two more shapes. George, please come up and point to the one which is a square.

In this category system, none of the teacher demands on this page would be coded as Remembering.

III. Match the statements on the right with the questions on the left:

_____A. Teacher: Do you know how the fire got started?

_____B. Teacher: Why do you think you shouldn't put water on some kinds of fires?

_____C. Teacher: In this picture what is the man using to put out the fire?

_____D. Teacher: What is the name of the fire truck that's used to reach high windows?

1. This is coded Re.
2. This is not coded Re because it is a binary question.
3. This is not coded Re because the important cues are presented visually or auditorily to the child.
4. This is not coded Re because it requires manipulation of information.

IV. Code each Remembering question in the following teacher-pupil interaction by writing Re in the blank.

_____A. Teacher: Andy, I am not sure you are listening to the story. What is the name of the boy in the story, Andy?

Andy: Ted.

_____B. Teacher: That's right! Sarah, you see a picture on top of page 32. Tell me what you see in the picture.

Sarah: I see a house and there is a boy in front of the house wearing a red shirt.

_____C. Teacher: What is the boy's name, Sarah?

Sarah: His name is Ted.

_____D. Teacher: Very good! Buddy, what do you think is going to happen in the story?

Buddy: I have a red shirt and my house is white.

_____E. Teacher: Buddy said yesterday that his house was made out of red bricks and today he just told us that his house is white. How could his house be made out of red bricks and be white? Jane?

Jane: It can't be. He's lying.

_____F. Teacher: Steve, what do you think the solution is?

Steve: Maybe they put white paint on top of the red bricks.

In: Did the Butler do It?

Below are examples of the category called Inferring (In):

Mr. Jones, the science teacher, has dropped some naphthalene balls into a tall jar of dilute vinegar. He had just dropped some baking powder into the jar, and the "marbles" go up and down in a crazy fashion.

Teacher: Why do you think the marbles are going up and down, Renie?

Renie: That's because there are little bubbles sticking to the balls and they make them float.

Teacher: That explains why they go up. Why do they go down again, Elizabeth?

Elizabeth: I think that's because the bubbles burst when they reach the top. The balls become heavy again and they sink.

Teacher: Why do you think the bubbles sticking to the ball make it float up? Barbara?

Barbara: I think the bubbles make the ball lighter than water so it floats up.

V. Mark the one(s) which are true of cognitive demands in the Inferring category.

_____A. The child has all the information available to him.

_____B. The child has to figure out or guess some of the rules or facts.

_____C. The child has to come up with a solution to eliminate negative consequences.

The statements below are examples of different forms of Inferring (In) questions.

1. Bob lost his lunch money. How do you think he feels?

In this first example, the cause (antecedent) is given. The child is required to predict what is going to happen.

2. Why do you think Bob is sad?

In this example, the effect (consequence) is given. The child is required to guess the cause.

3. Bob lost some money. He is feeling afraid. Why do you think he is feeling afraid?

In the third example, both the antecedent and the consequent are given. The child is required to guess the relationship between them.

VI. Match the following Ins to their form:

_____A. If we continue heating the water, what will happen to the mercury in the thermometer?

_____B. Why do you think the balloon popped?

_____C. What do you suppose made the king happy?

_____D. People who are blind have a keen sense of hearing. Why do you think this happens?

_____E. What do you suppose happens to the beautiful plumage of a peacock when it starts snowing?

_____F. When the temperature rises, the length of mercury in the thermometer goes up. Why?

1. Antecedent (or cause) is given. The child is required to predict the consequence (or result).
2. Consequence (result) is given. The child is required to infer the antecedent (cause).
3. Both the antecedent and the resultant are given. The child is required to infer the relationship between them.

VII. Code the following teacher's questions as Re or In. Leave the space blank for all questions or demands which are neither Re nor In.

_____A. Teacher: Why do you think the Eskimo houses are shaped this way?

Rudy: I think so that it won't be very cold.

_____B. Teacher: Jake, what did the story say igloos were made of?

Igloos are made out of big blocks of ice that they cut out of the ground and pile up on top of each other.

_____C. Teacher: Daisy, why do you think it might be a bad idea to build a big fire in an igloo?

Daisy: How do they keep warm?

_____D. Teacher: Daisy, what question did I ask you, do you remember?

Daisy: (silence)

_____E. Teacher: Judy, what do you think would happen if they built a fire in an igloo?

Judy: I guess it might melt.

_____F. Teacher: If you couldn't start a fire in your home in the winter and there was no electricity and therefore no heat, how would you keep warm?

Phil: I'd curl up on the floor with my dog because he's warm.

Jim: I'd put on lots of clothes and stay in the warmest room with my brothers.

George: I'd go next door.

_____G. Teacher: Do the Eskimos wear heavy clothing?

Ruby: Yeah, I bet they do.

_____H. Teacher: Why do you think Eskimos wear heavy clothing?

PS: How Would You Fix That?

These are all examples of the next category of cognitive demand which is called Problem Solving and coded PS.

Teacher:	We've got to stop the plant from growing toward the window. How would you do that, Harriet?
Harriet:	I guess I'd turn the pot around so that the plant's bending away from the window.
Teacher:	Let's suppose you do that and the plant bends in the opposite direction and continues growing toward the window. What would you do then?
Harriet:	I don't know. That's a hard question.
Teacher:	What would you do in this situation, Marty?
Marty:	First I'd try to figure out why the plant did that.
Teacher:	How would you find out why the plant is growing toward the window, Marty?
Marty:	I'd ask you.
Teacher:	Let's say I made it a rule that you are not to talk to me or to anybody else. Then how would you find out why the plant is growing toward the window?
Marty:	That is a problem. I don't know how to solve it.
Teacher:	Peter, what would you do in this situation?

VIII. Mr. Briggs was making problem solving demands on the pupils.
These demands required the pupil to:

_____A. Analyze the problem.

_____B. Make inferences.

_____C. Propose an appropriate solution.

Problem solving is more complex than the activities dictated by recall or inferring questions. Problem solving usually involves the task of inferring. But inferring is just one stage in problem solving. PS also involves coming up with an appropriate solution.

For example, "How would you get to school if you became blind?" is a PS demand. It involves inferring the consequences (e.g., "It would be difficult to go from one place to another by myself") and coming up with an appropriate solution with regard to those consequences (e.g., "I'd get a seeing-eye dog so I could come to school on my own").

IX. In each of the following pairs of demands, one is an In and the other is a PS. Check the PS.

_____A. Why doesn't the TV work?

_____B. How would you fix that TV?

....

_____C. What do you think is the main reason for the population explosion?

_____D. What do you think should be done to prevent the population explosion?

....

_____E. What makes some people litter bugs?

_____F. If you were the mayor of the city, what would you do about littering?

X. Code as PS those demands which are Problem Solving:

_____A. If you want to go to the circus, how could you earn enough money to pay for the ticket?

_____B. Which story did you like best?

_____C. How would you define the word "happy?"

_____D. How could you train a dog to do tricks?

_____E. What would be the best thing to do if you found an injured puppy?

_____F. What is the difference between a cat and a dog?

_____G. What would you do to teach a young child to tie his shoes?

_____H. If the door was locked and you didn't have a key, how might you get into your house?

_____I. Which of these animals looks the most like a cat?

_____J. How would you convince your mother to let you go to the movie?

_____K. What would you do if you were lost in the woods?

_____L. If there was no air in your bike tires, how would you get them filled?

Review

Remember that, when answering an Inferring question, the child is required to arrive at his own conclusions, deductions, hypotheses, or interpretations from available information. The response should involve some new discovery by the child.

1. Why do you think she ran away?
2. How would you feel if your pet was lost?
3. Where might the cat go?
4. What do you suppose is going to happen to her?

In the questions above, the way in which they are worded informs the pupil of the task. Inferring questions can thus be worded to suggest that the pupil's own ideas are sought.

The child, when answering a Problem Solving question, is confronted with a puzzling situation and is required to analyze the situation and come up with a solution.

1. If your dog was lost, how would you try to find him?
2. How would you keep a dog from running away?
3. What would be the best way to train a dog?
4. How might you find out how to care for a little puppy?

These Problem Solving questions are worded to indicate what situation must be resolved.

XI. Code the teacher demands or questions in the interaction below. If the demand is not an Re, In, or PS question, leave the space blank.

_____A. **Teacher:** You mean you don't remember your neighbor's name, Linda? How could you make sure you remember people's names?

Linda: I don't know.

_____B. **Teacher:** What is your address, Linda?

Linda: It's 2012 North Sesame Dr.

_____C. **Teacher:** Why do you suppose Linda can remember her address but not her neighbor's name?

Janet: I don't have any trouble remembering people's names.

_____D. **Teacher:** Phillip, what would you suggest Linda might do so that she would remember other people's names?

Phillip: She could say the name over again to herself whenever she met someone or heard his name.

_____E. **Teacher:** Linda, what do you think of Phillip's suggestion?

Linda: It might help.

_____F. **Teacher:** Linda knew her address, but I doubt that she knows my address. How could she find out what it is if, let's say, she wants to send me a letter? George?

George: I'd ask my mother.

_____F. **Teacher:** But, George, I don't think your mother knows my address. There must be a way you could find out without asking someone else. Phillip?

Phillip: If you have a phone, your name and address will be in the phone book.

_____H. Teacher: Very good. What do you think might happen to the letter if the address on the envelope is wrong? Judy?

Judy: You might not get the letter.

_____I. Teacher: Yes, but where might the letter go if the address was wrong?

Jackie: If Linda sent it and put her address in the corner, it should come back to her.

_____J. Teacher: Good! Linda, what did Jackie say you should put on the envelope besides my address?

Linda: My own address up in the corner.

_____K. Teacher: If we wanted to visit the post office to find out more about sending letters, what would we have to do so that the whole class could go?

Randy: Before, when we went on a class trip, we had to take letters to our parents; so we'd probably better get their O. K. for this, too.

_____L. Teacher: Randy, what do you think would happen if we went without your parents' permission?

Randy: Some parents might not like not knowing where we were and might get angry at you.

_____M. Teacher: Right. What might be the best way for us to get from the school to the post office?

Judy: I wouldn't want to walk, because it's so far.

_____N. Teacher: How could we find out how far it is to the post office from the school?

Linda: Maybe we could figure it out from the map of the city like we figured out that stuff on the other maps.

_____O. **Teacher:** What do you think we might see if we got a tour of the post office?

Phillip: Probably see them lugging mail around.

Pupils' Responses

The following sections provide criteria for evaluating the appropriateness of pupil responses. This evaluation of the pupils' responses should be used by the teacher when deciding what question should be asked next in order to best facilitate learning.

A: That's What I Wanted to Hear

When reading the dialogue below, note especially the pupil responses.

Teacher: What are the men who travel in space called?

Jill: Astronauts.

Teacher: How far away is the moon from the earth?

Jim: It's 240 thousand miles away from earth.

The above responses were Appropriate (A). An Appropriate response is one in which the child fulfills the task provided by the question. A response to a Remembering question is Appropriate if the pupil provides the information asked for.

Teacher: How do you think it would have felt to be the first man to walk on the moon?

Phil: I guess they felt excited and happy and sort of nervous.

Teacher: How could we find out how the astronauts felt when they first walked on the moon?

Gail: We could check in the old newspapers and see if they tell what the astronauts said it felt like.

Roger: We could write to the astronauts and ask them how they felt.

Teacher: Why do you think anyone would want to go on a space flight?

Jim: Probably because it's different and so exciting and not many get to do it.

An Appropriate response to an Inferring or Problem Solving question is one which provides relevant information, is reasonable, and is potentially correct. The response should also contain sufficient information to answer the question.

I. In the following examples, code the appropriate responses A. Leave the space blank if the response is not Appropriate.

Teacher: Why do people read newspapers?

_____A. Charlie: Because they like to read and the paper has different stuff in it each time.

_____B. George: My mom never reads the paper.

Teacher: How could we find out why people read newspapers?

_____C. Ginger: We could all ask people and report back to the class.

Teacher: What part of the paper do you think is read by most adults?

_____D. Pattie: Maybe the comics.

_____E. Phillip: No, I think most adults read the front page. That's where the most important news is.

Teacher: How could we find out the way a newspaper is run without going to visit the place where it is produced? Jeff?

_____F. Jeff: What?

_____G. Charlie: We visited the paper last year and a man showed us these huge printing things with lots of paper.

_____H. Ginger: I know a girl whose father works at a newspaper place, and maybe he could come and tell us about it.

Ia: That's Not Quite What I Wanted to Hear

Again note especially the pupils' responses in the following dialogue:

Teacher: During the Civil War, who was the general who led the South? Ralph?

Ralph: General Grant and he later became President.

Teacher: What do you think might be one of the reasons why the North won?

Tony: My father says that war is bad and that we shouldn't be fighting in Vietnam.

Teacher: If we don't think there should be wars, what can we do to help prevent them?

Candy: Everyone should vote.

Teacher: Candy, your answer was incomplete. If everyone voted they might all vote for people who say we should be at war. Roger, what do you think Candy was trying to tell us?

Roger: Candy said everyone should vote.

All these pupil responses are Inappropriate and should be coded Ia. A pupil's response is coded Ia if the pupil attempts to respond but does not fulfill the task provided by the question. An Inappropriate response is one in which the information given is incorrect, inadequate, or irrelevant.

II. Read the following teacher questions and pupil responses. Indicate which of the statements in the right-hand column best describes each pupil response.

T: How long is the President's term of office?

_____A. P: Three years, I think.

T: Why do some people get so excited about elections?

_____B. P: Not everyone gets excited, but some people really do.

T: How can you help someone get elected, even if you can't vote?

_____C. P: By babysitting.

T: Why do people vote for a person?

_____D. P: Maybe they think his ideas are better than other people's.

T: How can people find out what a person will do if elected?

_____E. P: They can read.

T: What kind of person might make the best President?

_____F. P: My dad doesn't like any of the candidates for President.

T: How could we make sure our parents vote?

1. This response is Ia, because it is incorrect.
2. This response is Ia, because it is inadequate.
3. This response is Ia, because it is irrelevant.
4. This response is A.

_____G. P: By voting for them.

T: How could you find out what adults do when they go to vote?

_____H. P: By listening.

III. Code the responses below as A or Ia:

Teacher: Our classroom is getting so messy that some of us have trouble finding things. How can we keep the room more organized?

____A. Jody: I like the mess.

Teacher: Jody, why do you think the room is such a mess?

____B. Jody: Probably because some of us like the mess.

Teacher: How much time did you spend hunting for your notebook yesterday?

____C. Jody: It seemed like the whole day, and I never did find it.

Teacher: Who do you think would be better off if the room was neater?

____D. Jody: I don't think we could keep the room neat.

Teacher: O.K. Tell me something we might do to keep the room more organized?

____E. Jody: Maybe we could make a game and win points by using free time to clean up the closet or books or stuff like that.

NR: You Didn't Tell Me Anything

Compare the pupil responses which follow with those of the last two categories:

Teacher: Pat, what do you think the weather will be like this weekend?

Pat: I don't know.

Teacher: How could we find out what the weather is going to be this weekend? Ray?

Ray: (silence)

Teacher: Bill, can you tell me what the weather was like yesterday?

Bill: I don't want to talk about the weather.

None of the pupils attempted to provide an answer to the teacher's question. These are all examples of the No Response (NR) category. The No Response category is used (a) when the pupil responds with silence, (b) when he verbally indicates a lack of ability to answer the question, or (c) when he demonstrates an unwillingness to try to answer the question.

IV. Match the statements about NR with the pupil responses below:

T: What did the story tell us about birds?

_____A. P: (silence)

T: What do you think it would feel like to be a bird?

_____B. P: That's silly; I don't like stupid questions.

T: Why do you think people shoot them?

_____C. P: Some birds steal seeds people plant in the ground.

T: How could we keep people from shooting at birds that need our protection?

_____D. P: I don't know; the story didn't tell about that.

T: What is the largest bird you've ever seen?

_____E. P: Chickens and turkeys are birds, too.

T: If you want to know the name of a bird you saw, what should you do so that you can identify it?

_____F. P: I don't like birds and don't care what they're called.

1. This is coded NR because the pupil responded with silence.
2. This is coded NR because the pupil indicated inability to answer the question.
3. This is coded NR because the pupil indicated an unwillingness to try to answer the question.
4. This is not coded NR.

V. Code the following responses as A, Ia, or NR:

Teacher: Why do you think it is important to get exercise?

_____A. Ralph: Are we going to gym today?

Teacher: What day is it today, Ralph?

_____B. Ralph: I really can't remember.

Teacher: Today is Wednesday, and yes, you do have gym this afternoon. Why do you think we have gym classes at school?

_____C. Ralph: So that we use our muscles.

Teacher: O.K. What might happen if we didn't use our muscles?

_____D. Rose: They get weak and then you can't do stuff.

_____E. Leroy: After I was sick and in bed for a long time and didn't use my muscles much, I felt really weak.

Teacher: How could we find out more about the reasons for exercising? Jackie?

_____F. Jackie: (silence)

_____G. Jerry: The doctor told my mother she'd better get more exercise.

Teacher: Why did he say she needed more exercise?

_____H. Jerry: I don't know.

VI. Code both the teacher's questions Re, In, or PS and the pupils' responses A, Ia, or NR in the dialogue which follows:

_____A. Teacher: John, about how old were you when you learned to ride a bike?

_____B. John: I think I was about eight.

_____C. Teacher: Who taught you how to ride?

_____D. John: My older brother helped me some. He used to hold the bike for me.

_____E. Teacher: What did he tell you about the rules you should follow when riding your bike?

_____F. John: I don't remember.

_____G. Teacher: Who can remember some rules of safety for riding a bike? Sandy?

_____H. Sandy: You should let people know when you're going to turn and watch out for people who are walking and watch out for cars.

_____I. Teacher: Good, Sandy. Mary, if you wanted to know whether or not a bike was safe to ride, how could you find out?

_____J. Mary: My bike is safe to ride. I ride it every day, almost.

_____K. Teacher: Jim, how could you find out if a bike was safe to ride?

_____L. Jim: There's a bike store downtown and they could probably check it to make sure the brakes and tires and everything were O.K.

_____M. Teacher: That's a good idea, Jim. John, what might happen if the brakes wouldn't work while you were going down a hill?

_____N. John: I'd probably try to stop the bike with my feet and if I was going too fast, I'd probably get hurt.

_____O. Teacher: What else might happen to you if the bike isn't safe?

_____P. Judy: (silence)

_____Q. Teacher: Jim, can you answer my last question?

_____R. Jim: One time I was going down a hill and my brakes didn't work, but I didn't get hurt because I stopped the bike by jumping off.

_____S. Teacher: If we want to find out about the city laws which people on bikes must obey, how could we find out? Joe?

_____T. Joe: A policeman would know the laws and would tell us.

_____U. Sandy: The rules are easy; you wouldn't need to bother a policeman.

_____V. Teacher: How could we be sure we knew all the city laws about bikes?

_____W. Billy: The laws are probably written down somewhere and we could read them.

_____X. Teacher: Why might it be better to read them than to ask someone what they are?

_____Y. Mary: Maybe the person you asked didn't know all of them or forgot to tell you one of the laws.

Confirmation: Teachers' Questions

Binary Questions:

I. A, C, and E are binary questions.

Remembering Questions, Re:

II. Only B is true of Remembering.

III. A-2, B-4, C-3, D-1.

IV. Only A and C should be coded Re. (B requires only that the pupil describes what he sees. D, E, and F demand more than memory of information.

Inferring Questions, In:

V. Only B is true of Inferring.

VI. A-1, B-2, C-2, D-3, E-1, F-3.

VII. A-In, B-Re, C-In, D-Pe, E-In, F-blank, G-blank (a binary question), H-In.

Problem Solving, PS:

VIII. A, B, and C should be checked. PS demands the pupil to do all three.

IX. B, D, and F are PS demands. (A, C, and E are In demands which the pupil would probably answer in the process of solving the problems.)

X. A, D, E, G, H, J, K, and L are PS demands.

Review:

XI.
A-PS
B-Re
C-In
D-PS
E-blank
F-PS
G-PS
H-In
I-In
J-Re
K-PS
L-In
M-PS
N-PS
O-In

Confirmation: Pupils' Responses

Appropriate Responses, *A*:

I. A, C, D, E, and H are appropriate responses.

Inappropriate Responses, *Ia*:

II. A-1
B-2
C-2
D-4
E-2
F-3
G-1
H-2

III. A-*Ia*, B-*A*, C-*A*, D-*Ia*, E-*A*.

No Response, *NR*:

IV. A-1
B-3
C-4
D-2
E-4
F-3

V. A-*Ia*
B-*NR*
C-*A*
D-*A*
E-*Ia*
F-*NR*
G-*Ia*
H-*NR*

Confirmation: Questions and Responses

VI. A-Re
B-A
C-Re
D-A
E-Re
F-NR
G-Re
H-A
I-PS
J-Ia
K-PS
L-A
M-In
N-A*
O-In
P-NR
Q-blank**
R-Ia
S-PS
T-A
U-Ia
V-PS
W-A
X-In
Y-A

*Note that here the pupil not only answered the In question, but also suggested a solution to the negative consequences he inferred.

**This should not be coded because it is a binary question.

APPENDIX D

Sample Cards From the Anticipation Booklets

Sample Cards From Anticipation of Videotape Booklets

6. (T) Re: Who was following Munk?

In: Why was the creek safe for Munk?

PS: How might Munk have gotten across the creek without getting wet?

---

6. (P) A: He thought he could get across the creek and they couldn't.

Ia: He ran to the creek.

NR: I don't know.

Sample Cards From Anticipation of Written Booklets

5. (P) Ia: It was safer.

6. (T) Re: Who was following Munk?
In: Why was the creek safe for Munk?
PS: How might Munk have gotten across the creek without getting wet?

---

6. (T) In: Why was the creek safe for Munk?

6. (P) A: He thought he could get across the creek and they couldn't.
Ia: He ran to the creek.
NR: I don't know.

APPENDIX E

Coding and Criterion Sheets

CODING SHEET

NAME ____________________

SEGMENT ____________ PART ____________

GROUP ____________ TIME ____________

1 T P RE ☐ A ☐ IN ☐ Ia ☐ PS ☐ NR ☐	2 T P RE ☐ A ☐ IN ☐ Ia ☐ PS ☐ NR ☐	3 T P RE ☐ A ☐ IN ☐ Ia ☐ PS ☐ NR ☐
4 T P RE ☐ A ☐ IN ☐ Ia ☐ PS ☐ NR ☐	5 T P RE ☐ A ☐ IN ☐ Ia ☐ PS ☐ NR ☐	6 T P RE ☐ A ☐ IN ☐ Ia ☐ PS ☐ NR ☐
7 T P RE ☐ A ☐ IN ☐ Ia ☐ PS ☐ NR ☐	8 T P RE ☐ A ☐ IN ☐ Ia ☐ PS ☐ NR ☐	9 T P RE ☐ A ☐ IN ☐ Ia ☐ PS ☐ NR ☐
10 T P RE ☐ A ☐ IN ☐ Ia ☐ PS ☐ NR ☐	11 T P RE ☐ A ☐ IN ☐ Ia ☐ PS ☐ NR ☐	12 T P RE ☐ A ☐ IN ☐ Ia ☐ PS ☐ NR ☐
13 T P RE ☐ A ☐ IN ☐ Ia ☐ PS ☐ NR ☐	14 T P RE ☐ A ☐ IN ☐ Ia ☐ PS ☐ NR ☐	15 T P RE ☐ A ☐ IN ☐ Ia ☐ PS ☐ NR ☐

CODING SHEET

CRITERION

SEGMENT VI PART B

1 T P RE ☐ A ☐ IN ☒ Ia ☒ PS ☐ NR ☐	2 T P RE ☐ A ☒ IN ☐ Ia ☐ PS ☒ NR ☐	3 T P RE ☐ A ☒ IN ☐ Ia ☐ PS ☒ NR ☐
4 T P RE ☐ A ☒ IN ☒ Ia ☐ PS ☐ NR ☐	5 T P RE ☐ A ☒ IN ☒ Ia ☐ PS ☐ NR ☐	6 T P RE ☐ A ☒ IN ☒ Ia ☐ PS ☐ NR ☐
7 T P RE ☐ A ☒ IN ☒ Ia ☐ PS ☐ NR ☐	8 T P RE ☐ A ☒ IN ☐ Ia ☐ PS ☒ NR ☐	9 T P RE ☐ A ☒ IN ☒ Ia ☐ PS ☐ NR ☐
10 T P RE ☐ A ☒ IN ☐ Ia ☐ PS ☒ NR ☐	11 T P RE ☐ A ☐ IN ☐ Ia ☒ PS ☒ NR ☐	12 T P RE ☐ A ☐ IN ☐ Ia ☒ PS ☒ NR ☐
13 T P RE ☐ A ☒ IN ☒ Ia ☐ PS ☐ NR ☐	14 T P RE ☐ A ☒ IN ☐ Ia ☐ PS ☒ NR ☐	15 T P RE ☐ A ☒ IN ☐ Ia ☐ PS ☒ NR ☐

APPENDIX F

The Transcript

TRAINING MATERIALS FOR IMPROVED TEACHER QUESTIONING

Transcript of Teacher-Pupil Dialogue

Karen Greenough

Practice Segment

"Hobo"

T: *Yeah, that's right; that's where he buries them. I wonder why he does that. Why do you think he buries bones?*

P: *So nobody can take them.*

T: *So nobody can take them. That's good. Why do you think somebody would want to take Hobo's bones?*

P: *Throw them in the garbage.*

1. T: If you were Hobo--now put yourself in Hobo's place--and you had, say, 15 bones and you buried them all over the yard, how would you find these bones again?

P: Dig up the whole yard.

T: *That's one way he could do it. He could go through and keep digging up the yard until he found them. Are there any other ways you think he could find them?*

P; *He could put his footprint on it and next time he goes looking for it, he could see his footprint.*

2. T: Right. That is a very good way. You certainly could do that. What would happen if Hobo had 15 holes in the yard, and he put his footprint on each one of them, but it rained?

P: It would wash them away.

Segment 1

Part A

"Munk"

T: *Why do you think the cats were chasing Munk?*

P: *They wanted to eat him?*

T: *What does a chipmunk look like?*

P: *Well, it's brown and got a stripe down its back and it lives in the ground.*

1. T: How do you think Munk knew someone was watching him?

P: He could hear them.

2. T: How do you know when someone is watching you?

P: I don't know; that's hard to tell.

3. T: Suppose you were out in the woods and a bear came after you--a big brown bear--where would you hide?

P: I don't know.

4. T: How could you keep a bear from eating you up?

P: Run.

5. T: Why did Munk run toward the creek?

P: It was safer.

6. T: Why was the creek safe for Munk?

P: I don't know.

7. T: What did he do when he got there?

P: Swim across.

8. T: What do you think would have happened to Munk if he couldn't swim?

P: He'd drown.

9. T: Munk jumped into a mouse hole. What do you think would have happened if there would have been a mouse in there already?

P: He would eat him.

T: *Mouse would eat Munk or Munk would eat the mouse?*

P: *Munk would eat the mouse.*

10. T: How long do you think Munk would have to stay in the hole before he could come out?

P: About an hour or so.

11. T: If there was a man running and someone were chasing him and he came running into your house while you were watching T.V. in the evening, what would you do?

P: Ask him what was wrong.

12. T: If he said, "There are two men chasing me. I want to hide here." What would you do?

P: Hide him.

13. T: How would you do that?

P: Put him in the attic.

14. T: What do you think chipmunks eat?

P: Mice.

15. T: What were the cats going to eat in this story?

P: Chipmunk.

Segment 1

Part B

"Hobo"

T: *What color do you think Hobo was?*

P: *Black, white, and brown, I guess.*

T: *What kind of dogs are black, white, and brown?*

P: *I don't know. Mine is.*

1. T: Why did Jerry and Judy wait until their parents were not at home to give Hobo a bath?

   P: Parents would get mad at them.

2. T: Why would their parents get so mad?

   P: I don't know.

3. T: Well, suppose Jerry and Judy's parents came home and went upstairs and saw Jerry and Judy giving Hobo a bath in the bathtub. What do you think they would have done then?

   P: I don't know.

4. T: You said that if your dog was dirty, you'd want to clean him up. How would you do it?

   P: Put soap suds on him.

5. T: Where would you clean up your dog?

   P: Bathtub.

   T: *Do you think your parents would get mad if you cleaned up your dog in the bathtub?*

   P: *Yes.*

6. T: What do you think they would do to you?

   P: I don't know.

7. T: Why do dogs bury bones?

P: I don't know.

8. T: Seems like dogs like to dig in the dirt a lot. Why do they like to dig in the dirt so much?

P: Well, it's cold.

9. T: How do you think Jerry and Judy could keep their parents from finding out about the mess Hobo had made?

P: Clean it up.

10. T: How would they do that?

P: I don't know.

11. T: If you spilled something when your parents weren't at home--suppose you were going to eat something when your parents weren't at home and you got out a bottle of ketchup, and you were putting the ketchup on something and you dropped it--how would you clean it up before your parents got home?

P: Rag.

12. T: What do you think Jerry and Judy did after they caught Hobo and took him outside and started cleaning up the mess?

P: They used a rag, I guess.

13. T: How do you think they felt?

P: Sad.

14. T: If one of your dogs got loose in your house and was running all over, how would you catch him?

P: Run after him.

15. T: What would you do after you caught him?

P: I'd give him a good bath.

Segment 2

Part A

"Hunk"

T: *If you were the cats, or if you were just you, how would you catch a chipmunk?*

P: *(silence)*

T: *What would you try to do?*

P: Feed *it.*

1. T: O.K. How do you think Hunk felt when he thought somebody was watching him, at the beginning?

P: He was scared.

2. T: Yeah, he was scared. Right. How would you feel if one night you were lying in your bed and all of a sudden you thought somebody or something was hiding under your bed watching you?

P: I'd be ascared, too.

3. T: Yeah. You would be scared, too. So would I. What would you do?

P: Get in the closet.

4. T: That's a good idea. You have a closet in your bedroom. What else could you do? What if you didn't have a closet in your bedroom? What would you do?

P: Hide under the covers.

T: *Hide under the covers. What . . . that would probably keep you, keep you a little bit safer, wouldn't it?*

P: *Yeah.*

T: *Well, Hunk didn't have a chance to do any of that, did he?*

P: *(silence)*

5. T: What did he do to get away from the cats?

P: (silence)

6. T: Why, why did he start to run?

P: Because he didn't want to get ate up.

7. T: Right. That's right. He was really trying to get away from the cats, wasn't he? How do you think that Munk knew that somebody was watching him? Remember at the beginning he sort of had a feeling that somebody was watching him. How do you think he knew?

P: He saw two eyes.

T: *Right, two eyes were, two eyes? More than two eyes, there were two cats.*

P: *Four eyes.*

8. T: Right there were four eyes peering out at him. You know, after he jumped over the creek, what did he find to hide in?

P: (silence)

9. T: Remember he found a mouse hole. A little mouse hole. He went into it at the end. What if he didn't find a mouse hole, where else could he have hidden or how else could he have gotten away from the cats, do you think?

P: Climb up a tree and hide in a nest, nest.

10. T: Hide in a nest. That's a good idea. Do you think the cats, well, what if the cats would climb up the tree after him? What would happen?

P: He'd play like, he could play like he's a little baby birdy.

11. T: Oh. And then the cats wouldn't recognize him. That's a really good idea. Suppose that, suppose that you were in the woods--just like the chipmunk was--and all of a sudden a big cow came running, out of the woods and started chasing you. What do you think you would do?

P; I'd climb up a tree.

12. T: Oh, you'd climb a tree. And why do you think you'd be safe if you climbed a tree?

P: Because a bull can't climb.

13. T: That right. That's right. Well, there are some animals that can climb trees, aren't there? Suppose a bear was chasing you. Ooh! That's even scarier. What would you do?

P: (silence)

14. T: In this story, the two cats were really quiet when they were following Munk, weren't they? And he didn't have a chance to see them. Why do you think the cats were so quiet?

P: Because he wanted to sneak up on the chipmunk.

15. T: That's right. They wanted to just sneak up on him all of a sudden, didn't they? Take him by surprise. How did the chipmunk finally find out that the cat was hiding in the leaves?

P: (silence)

Segment 2

Part B

"Hobo"

T: *Why do you think the title is called, "Hobo, a Dirty Dog?"*

P: *Well, he was dirty all the time.*

T: *Yeah. How did he get dirty?*

P: *Playing in the mud.*

1. T: Yeah. Outside in the yard, playing in the mud. Why do you think--uh. How do you think Hobo felt when the kids took him in and he saw the bathtub?

P: He was scared.

2. T: Why do you think dogs don't like to take baths?

P: (silence)

3. T: Dogs probably just don't like to take baths the way people do; they'd rather get clean some other way. What could we do to keep pets clean? You have lots of pets. What do you do to keep your pets clean, besides putting them in a bathtub?

P: Don't let it go outside.

4. T: That's a good idea. Just don't let it go outside. Well, what if you had a lot of pets that play outside a lot. What could you do to keep them from getting the house dirty?

P: Put it in a cage.

5. T: Put it in a cage inside the house, or outside. That's a good idea. Why do you think Hobo liked to be dirty?

P: (silence)

6. T: Think about when he's outside in the yard and when he's getting dirty. What is it that he's doing, usually, to get dirty? What makes him so dirty?

P: (silence)

7. T: What do your dogs do to get dirty?

P: Get in the mud and . . . .

8. T: Yeah. They like to roll around in the mud a lot, don't they? Suppose that, in this story, instead of it being Judy and Jerry, it's you and, O.K., and your two dogs. And you tried to do this with your dogs and they did the same thing that Hobo did--they jumped out and left soapsuds and water all over the house. How would you clean up that mess before your parents came home and saw it?

P: (silence)

9. T: What would you do to get that mess cleaned up?

P: I'd get the mop.

10. T: You have a lot of ways to clean it up, don't you? What about your other sisters and brothers you have. How could you have them help you?

P: My sister sweeps.

11. T: You could have the whole group working together really fast, couldn't you? That would be fun. If one of your dogs was just running through the house making a big mess--you know, like Hobo was doing--how would you catch him?

P: Tell him I'll give him some food.

12. T: Oh. You've got that same old trick that you used with the chipmunk. Get some food and try to bring him here. How do you think, after this whole thing was over, how do you think Hobo felt, you know, about Jerry and Judy? How did he feel towards them?

P. Probably was scared.

13. T: He probably was scared. He probably was kind of angry at them because they tried to force him to take a bath. What do you think Jerry and Judy could do, now that this is all over, what could they do to make friends with Hobo again and to make him like them again?

P: Don't wash him.

14. T: Don't wash him. That would help, wouldn't it? Not try to do that again. What else could they do to, you know, make friends with him and to make up with him after this was over?

P: Pet him.

15. T: Pet him. Dogs like to be petted, don't they. That's a really good idea. After Hobo's bath, he was probably kind of clean because he had the soap and water all over him. But then he got dirty again. How do you think Jerry and Judy could have kept him from getting so dirty . . .after his bath was all over?

P: Left him, leave him in the house for a little while.

Segment 3

Part A

"Hobo"

T: *Why do you think Hobo liked Jerry and Judy so much?*

P: *Well, he uh, they liked to, he liked to play in the dirt and they were the best friends that he had.*

T: *Yeah, they were pretty good friends, weren't they? If you were a dog, what kind of a home would you like to have?*

P: A *castle.*

1. T: A castle, wow. What's nice about a castle?

P: Well, you have a lot of, you've got a lot of space to walk and you have a lot of big parties, and you have a lot of, and you've got to have a king and queen and some slaves, and some other stuff.

2. T: Why do kids want to give their dog a bath?

P: Well, he's getting so dirty. He gets dirty and digs bones up and he gets dirty.

3. T: Why did they wait till their parents weren't at home?

P: They wanted to give him a bath. They well, Judy got her mom's shampoo and put it on him and got . . . and that other boy got his dad's hair brush and they got Hobo in the bathtub and they covered him all up with soap and he didn't like it and he ran around.

4. T: How do you think their mom and dad felt when their mom and dad got home?

P: They were awful mad.

5. T: Do you think they were? Why would they be mad?

P: Well, they found out Hobo was using their dad's brush and their mom know they was using her shampoo.

6. T: Yeah, right, right. If your mom and dad were mad with you, what would you do to make them feel better?

P: I'd tell them I'm sorry.

7. T: You would. Think that would work every time? O.K. How do you think Hobo felt when they were trying to give him a bath?

P: Hobo did not like it and he didn't want a bath. He wanted to be dirty, like a hobo.

8. T: Why did he want to be dirty?

P: I don't know.

9. T: Why do you think they called him Hobo?

P: Because he gets so dirty. He wears Hobo clothes.

10. T: Now, if you had a dog and your dog was really dirty, out, just out everywhere, how would you give him a bath?

P: I'd take a tub outside and if he gets out, try to catch him and put him back in where no soap suds will get in the house.

11. T: Why do dogs bury bones?

P: Well, they'll know where they're at the next time they want to bury another one.

12. T: Uh huh. Uh, suppose dogs had a bone and there wasn't any place around where he could bury it, where else could he hide it?

P: In his dog house.

T: *Mmm, can you think of any other place?*

P: *Or in his dish, or in his mouth.*

13. T: What makes a good hiding place? What kind of places are good hiding places?

P: In the . . . no, not in the garbage.

14. T: How do you think Jerry and Judy are going to feel now that Hobo's all dirty again?

P: They'll, well, they'll say, "Let him get dirty; he's all, he gets dirty all the time."

15. T: If you give your dog a bath, how could you keep him from getting all dirty again?

P: Leave him in the house.

Segment 3

Part B

"Munk"

T: *How do you think Munk knew someone was watching him?*

P: *'Cause, because he saw, because he didn't want to get hurt, 'cause he was loose and he hurt somebody and hit one of the cats and them other, them two cats they tried to get him and kill him and tried to hurt him and they didn't, they didn't catch him.*

T: *How would Munk feel when he was being watched?*

P: *He didn't feel very happy.*

1. T: How would you feel if you knew you were being watched?

P: I would start running as far as I could, and if they didn't never catch me, I'd go out to my grandma's house.

2. T: Now, suppose you wanted to watch someone else and you didn't want them to know you were watching, how would you do that?

P: I'd hide in the woods where the dark really is.

3. T: Right. Why do you think Munk ran into the forest, or the woods?

P: Well, them two cats were chasing him and he had to go across the creek, and he saw a little mouse hole where they won't ever, where they won't find him at all, and if they'd give up, he'd come out.

4. T: If there hadn't been the mouse hole, how could he have gotten away from the cats?

P: Uhh, go to a house and ask somebody to help him and ask them to try to kill them two cats from not killing the chipmunk.

5. T: Why is the woods a good place to hide?

P: Well, the woods is real dark and spooky and comfortable where they want to live.

6. T: If the cats knew that Munk was down in the mouse hole, how could they get him out?

P: Dig the mouse hole with their claws.

7. T: Now, why do you think Munk ran towards that creek?

P: Where they wouldn't find him; where he could swim across and start find something where he can hide from.

8. T: Why don't the cats swim across the creek?

P: To catch him, try to catch him.

9. T: O.K. If you were out in the woods--now you said woods was a good hiding place--now if you were out in the woods and somebody were chasing you, where would you hide?

P: In a tree where all the leaves is real green and they would never see me; I would not make a move until they went by.

10. T: What time of year would that be good for?

P: The summer.

T: *Right, right. Would that be good for the winter?*

P: *No, they'd see me then.*

11. T: Why would they see you in the winter time?

P: Well, the leaves, no leaves is on the trees and the leaves fall.

12. T: Munk hid down in the mouse hole, we know he hid down in the mouse hole, but suppose he were down there and he was really quiet and the cats were looking for him but they didn't know where he was, how could they find him?

P: They'd look all over the place and then if they didn't find him, and something moved, they'd know he was in the mouse hole. If the mouse or something's moving, they might think it's the chipmunk.

13. T: If you didn't, if you had a cat and you didn't want it to chase chipmunks, how could you keep it from chasing chipmunks?

P: Tell them it's not very, tell them, tell them to come to you and whip them on the rear.

14. T: What do you think those cats looked like in the story?

P: Well, one might have been gray, and one might have been black. The gray one was really mean, the black one was really angry at him.

15. T: The small one, the smaller one of the two was looking for Munk when he was hiding in the leaves. And . . . how did he know that Munk was hiding in the leaves?

P: He must of saw him go over there and he started to crawl where nobody'd see him.

Segment 4

Part A

"Hobo"

T: *O.K. Why did the kids give their dog a bath?*

P: *Cause he was dirty.*

T: *Why did Jerry and Judy wait until their parents were not at home before they gave him the bath?*

P: *(silence)*

1. T: How did Hobo feel about Jerry and Judy when they tried to give him a bath?

P: He didn't like it.

2. T: He didn't? Why not?

P: Cause, it probably did get, probably got in his eyes.

3. T: Yeah, it probably did. If you had a dirty dog, why would you give him a bath?

P: (silence)

4. T: Why do you think? Why do you take a bath?

P: (silence)

T: *Hmm, why do you take a bath?*

P: *Cause I'm dirty.*

5. T: Why would you give a dirty dog a bath?

P: Cause he'd be dirty.

6. T: That's right. Why do you think Jerry and Judy's parents might be angry with the kids?

P: Cause the kids wouldn't wait 'till they got home.

7. T: Yeah, what else happened? What happened to the house?

P: It got all soap and watery.

8. T: That's right; that wouldn't make them happy, I guess. How could the kids keep their parents from finding out about the mess?

P: Clean it up.

9. T: Right. Why do you think Hobo liked to be dirty?

P: (silence)

10. T: How did Jerry and Judy trap Hobo under the kitchen table? That's where they finally caught him after he jumped out of the bathtub. How did they catch him under the kitchen table?

P: (silence)

11. T: Before they brought him in for a bath, Hobo was out in the yard burying bones. Why do you think Hobo liked to bury bones?

P: (silence)

12. T: If the bathtub was broken, how could Jerry and Judy give Hobo a bath?

P: (silence)

13. T: What else could they use?

P: They could take him outside and spray him.

14. T: Spray him with what?

P: A hose.

15. T: A hose, just wash him down with a hose. If you were a mother and you came home and found such a mess at your house, what would you do?

P: I'd be mad.

Segment 4

Part B

"Munk"

T: *All right, the story said, uh, that there were two mean cats. Why did Munk think the cats were mean?*

P: *Because the cats was chasing him.*

T: *Yeah, you'd think they were mean, too, if they were chasing you, right? O.K. There was a large cat and a small cat. Why were they in the forest together?*

P: *Probably looking for food.*

1. T: And who did they have in mind for food?

   P: The chipmunk.

2. T: Yeah, I think so. Why did Munk run toward the creek?

   P: So the cats wouldn't chase him.

3. T: What could Munk do if he ran down to the creek, but he couldn't swim?

   P: The cats would get him.

4. T: If Munk ran, swam across the creek and there was no mouse hole there, where could he go then?

   P: Go up in a tree.

5. T: Uh huh. And if Munk ran down the mouse hole and he found that the mouse was home, what could he do then?

   P: (silence)

6. T: How could the cats get Munk if they knew he was hiding in a mouse hole?

   P: (silence)

7. T: If you were a cat, how would you get him out?

   P: Pull him by his tail.

8. T: Right. Why didn't the cats swim across the creek?

P: The water might be full.

9. T: Uh huh. That's right. If you were in the forest and you were being chased by somebody or something, where would you hide?

P: I'd be running up to the tree.

T: *You would? Do you climb trees?*

P: *Yeah.*

10. T: If you didn't want your cats chasing chipmunks, what would you do?

P: I'd chase, I mean, I'd shoot the cat.

11. T: What do you think the cats look like?

P: Chinese cats?

12. T: How did the little, how did the small cat know that Hunk was hiding in the leaves?

P: (silence)

13. T: If you wanted to find a chipmunk, where would you look?

P: Up in a tree.

14. T: Up in a tree. If you wanted to feed a chipmunk, what would you give it to eat?

P: Peanuts.

T: *Peanuts, anything else?*

P: *Uh uh. (no)*

15. T: That's it, it certainly likes peanuts, I guess. Where do chipmunks live?

P: Underground.

Segment 5

Part A

"Hobo"

T: *Why do you think Jerry and Judy waited 'til their parents were gone to give the dog a bath?*

P: *I don't know . . . they gone to the grocery store.*

T: *But why do you think they waited until then? Why didn't they give the dog a bath while their mom and dad were in the house?*

P: *They'd get a whippin'.*

1. T: Why?

P: 'Cause they don't suppose to do it.

2. T: How do, how did Hobo feel whenever Judy and Jerry started to give him a bath?

P: Sad, um, sad. He though he was their friend. They were his friends.

3. T: And then what happened?

P: Then he run in around the house; then he got soap all over the place, and then the girl, Judy, and the other girl and boy drug it outside.

T: *If you had a dirty dog, if Puppy were dirty, would you give him a bath?*

P: *Um-hmmm. He wouldn't run away.*

4. T: Why would you give him a bath?

P: 'Cause, he'd be dirty, and it stinks.

5. T: How would you give him a bath?

P: With soap and water. Then take a dog brush and brush its hair.

6. T: What might Jerry and Judy's parents do when they find out what the kids have done?

P: They could get in bad trouble.

T: *Do you think they might be angry with the kids?*

P: *Yes.*

7. T: Why?

P: 'Cause, the floor, the carpet would be watery, have water on it, and they could tell something happened.

8. T: What do you think they might say when they get home?

P: They'd have to, they'll say, they'll say, "You kids have to go to bed," and if they don't go to bed, they get a whipping.

9. T: What would your mom and dad say if you did that?

P: I'd get a whipping. They wouldn't say nothing; they'd say, "Bend over, get a whipping." And I'd have to go to bed.

10. T: How could the kids keep their parents from finding this mess?

P: Take something and clean it up out of the carpet. Like it says on T.V., the carpet cleaner. Some dirt or anything, you spray it on all over the carpet and stuff, you know, stuff goes away.

11. T: Why do dogs like to bury bones?

P: 'Cause they can save them for the next time. To chew on 'em 'till they bite them and eat them up. My dog does it. Fifi, she used to do it.

12. T: Well, if Fifi wouldn't come when you called her, how would you catch a dog like Fifi that was running through your house, making a mess like Hobo did?

P: Go and get it, get it.

13. T: How?

P: Take a shotgun at it.

T: *In the house?*

P: *Um-hmmm. Not really. But I can catch it.*

14. T: How would you keep the dog from digging in your yard?

P: I don't know. Keep away from the yard. We had a yard, but it couldn't dig in, dig 'cause it had water in it, and had stickers around it.

15. T: What if you were all dirty and your mom and dad wanted you to take a bath. How would you keep from doing it if you didn't want to?

P: Hide.

Segment 5

Part B

"Munk"

T: *Ooh, how would you catch a chipmunk?*

P: *Well, this lady brought one 'cause a cat was chewing on it. She put it in the yard, in the dif . . ., in the lady's yard, where they didn't have no cat. But the lady, she put him in the yard; it had a cat, too. She had a cat. Well, she caught it. She snuck up behind it and grabbed it. So the cat chewed it up. It never ran; it stayed in one place. It's ascared of people. It just stayed in one place.*

T: *Well, if it wasn't a chipmunk that a cat had already chewed, how do you think you'd catch it?*

P: *Would, you would have to get beside, get over by, beside it, before it gets ready to run, put your hand on it, get hold of it, grab its tail and pick it up. We have two gerbils; we had five, but three of them died.*

1. T: How do you take care of them?

P: You have to feed 'em sticks and this stuff. You have to get some popcorn stuff or whatever it is, well, you put some in it and then they eat it. And then put some sticks in there, and it chews it all up. Put some paper in there, and it chews it all up, too.

2. T: Sounds like it eats a lot. How do you think Munk knew that somebody was watching him?

P: 'Cause he saw the four eyes. And he saw a long tail, over by the bushes.

3. T: How do you think he'd feel?

P: Sad. He'd be scared. So scared.

4. T: Why did Munk run through the forest?

P: 'Cause the cats was running after him.

5. T: How, why did he run into the mouse hole?

P: 'Cause, so the cats can't chew him up and eat him.

6. T: Where else would, could he have hidden from the cat if there wasn't a mouse hole around? Where else do you think he might have hidden?

P: It'd be in that, in a hole there, in a hole, a gopher hole.

T: *Anywhere else?*

P: *Uh huh, squirrel's hole, up a tree.*

T: *O.K. How do you think the cats could have gotten Munk in the mouse hole? Could they reach him in the mouse hole?*

P: *No. Less they stuck their foot in there and then all Munk had to do was bite his foot.*

T: *Was there any other way they could reach him there in the mouse hole?*

P: *No.*

7. T: O.K. What if the cats were dogs? How would they catch him then?

P: Stick their foot in there and try to grab him.

8. T: Why didn't the cats swim across the creek?

P: To get the chipmunk.

T: *Why didn't they, though? Remember they jumped across the creek instead of swimming.*

P: *They had long legs.*

9. T: Possible. If you were in the forest and you were being chased, where would you hide?

P: I don't know. Up a tree.

10. T: O.K. Um, if you didn't want cats chasing chipmunks, what would you do?

P: Stop the cat.

11. T: How would you stop the cat?

P: Take a stick and try to hit him with it.

12. T: What do you think the cats looked like?

P: Black and white, or one's plain white or one's plain gray. Some of them's all black.

13. T: What do you think these two cats looked like?

P: They have blue eyes, have black tails and black nose, and gray and black and blue all the way around on its body.

14. T: If you wanted to find a chipmunk, other than one that's been chewed up by a cat, where would you look?

P: In a hole, in a mouse hole. Or a gopher hole.

15. T: Where would you go to find the gopher hole?

P: Down there, I think it's down there where they play golf. Or out in the forest.

Segment 6

Part A

"Munk"

T: *How did Munk feel when he was being watched? What do you think he felt?*

P: *He was mad.*

T: *He was mad?*

P: *Yeah.*

T: *Why would he be mad?*

P: *Because he don't like people watching when he's eating.*

1. T: Maybe so. Why did he run through the forest?

P: 'Cause they was after him.

2. T: Uh huh. Why did he run into a mouse hole?

P: Where they won't catch him.

3. T: O.K. Why wouldn't the cats be able to catch him in a mouse hole?

P: 'Cause it's too little to get in there.

4. T: How else could Munk have gotten away from the cats, if there had been no mouse hole.

P: They would catch him.

T: *You mean he wouldn't have been able to get away?*

P: *No.*

5. T: Why do you think Munk ran toward the creek?

P: For they, for he can go in the water for they won't see where are they--where is he.

6. T: O.K. How about cats? How do the cats, how do cats feel about the water?

P: Mean.

7. T: Mean? Why didn't the cats swim across the creek?

P: I guess they didn't want him that bad.

8. T: Maybe so. Well, they leaped across. If you were in the forest and were being chased, where would you hide?

P: In a tree.

9. T: How would you hide in a tree?

P: Uh, go all the way up to the top, tip top.

10. T: Climb all the way up? How could the cats find Munk after they reached the other side of the creek and they didn't see him?

P: Because he went fast and they couldn't catch up with him, he went in the water so he ran a little faster so they couldn't catch him. They couldn't see where he was going.

11. T: If you had cats for pets and you didn't want them to go chasing chipmunks, what would you do?

P: I would go chase the cats and make them come back.

12. T: Then what would you do?

P: If they don't come back, I'd just say, "Help, help."

13. T: What do you think the cats looked like?

P: Black, brown, sometimes white and brown and black.

14. T: How big do you think they were?

P: (Indicates size with hands). Sometimes they're big ones. There's some outside the other day; yesterday there was some.

15. T: How did the small cat know that Munk was hiding in the leaves?

P: He was watching whatever move the chipmunk made.

Segment 6

Part B

"Hobo"

T: *Why didn't Hobo like to take a bath?*

P: *He just likes to get dirty instead of taking a bath.*

T: *If you had a dirty dog, why would you want to give him a bath?*

P: *For he could be clean.*

1. T: Why would you want him to be clean?

P: For he won't get dirty then when you get done with him, he'll go back out and do it again.

2. T: How would you give your dog a bath?

P: Put him in a bathtub and put some soap in there and scrub him up real good.

3. T: How would you keep him in there?

P: Hold him down.

T: *If you had to hold him down, then how would you be able to wash him?*

P: *I'd just hold his thing (collar) like this, and go (airplane sound) all over the place.*

4. T: What might Jerry and Judy's parents do if they find out what the kids have done?

P: They would, uh, feel bad if they had to give him away.

5. T: What do you think they might say when they get home? Their parents.

P: They probably say, "Did you take Hobo a bath"; they say, "Yeah," and then they'll probably take him away somewhere, somewhere else.

T: *Take Hobo away?*

P: *Uh huh. (yes)*

6. T: Why?

P: Because they don't like him to take a bath in somebody's bathtub.

7. T: Oh, I see. Why do dogs bury bones?

P: Uh, for, when they wanta go back they can eat a bone.

8. T: How could the kids keep their parents from finding out about the mess?

P: They'll clean it up and don't tell nobody, their parents or nothing.

9. T: Why do you think Hobo liked to be dirty?

P: Uh, he likes to mess around in the, with burying bones and he might get dirty instead of getting clean up.

10. T: How would you catch a dog that was running through your house making a mess?

P: I would say, "Ho, ho, ho," and I'd get somebody over there to chase him outside and somebody will pick him up and I'd take him.

11. T: How would you keep your dog from digging in your backyard?

P: I couldn't, 'cause everytime I'd try to pick him up and put him somewhere else, he'd go back again the same thing again.

12. T: How would you keep from taking a bath?

P: I would take a bath.

13. T: You would take one? How are Jerry and Judy going to feel when they see that Hobo is all dirty again?

P: They're going to feel bad.

14. T: If your parents are angry with you, how can you make it so that they're not angry?

P: Say we put him in the bathtub and gave him a scrub and he got back outside and we put him outside to see if he won't get dirty again and he got dirty again. Tell them the whole truth.

15. T: If your dog was angry, how could you make friends with him again?

P: By telling the whole truth and say, "We won't give you a bath anymore."

APPENDIX G

The Stories

Training Dialogues:

- Hobo, a Dirty Dog
- Munk, the Chipmunk

Question Generation Exercise:

- Fright in the Night
- The Big Game
- Tigger
- A Wild Ride
- Willy the Woodchuck

Criterion Teaching Task:

- A Shiny Blue Bike
- The Hat
- Inkspot
- Meek the Field Mouse
- Sammy Squirrel

Readability, Chall Formula

Story	No. Words	Raw Score
A Shiny Blue Bike	211	4.334
A Wild Ride	217	4.4652
Fright in the Night	214	4.339
Hobo, A Dirty Dog	220	4.372
Inkspot	214	4.2892
Meek, the Homeless Field Mouse	207	4.4486
Munk, the Chipmunk	220	4.3010
Sammy Squirrel	212	4.4920
The Big Game	213	4.4956
The Hat	219	4.3977
Tigger	214	4.3417
Willy the Woodchuck	212	4.4868

Hobo, A Dirty Dog

Jerry and Judy had a big, fluffy dog named Hobo. Whenever the kids played in their yard, Hobo would bury bones and get very dirty. Hobo thought Jerry and Judy were the best children any dog could have.

One day when their parents were not at home, the kids decided to give their dog a bath. Judy got some of her mother's shampoo. Jerry got his father's hairbrush. They took Hobo into the bathroom and filled the bathtub with soap and water.

When Hobo saw what was happening, he tried to run from the bathroom. "I thought they were my friends," he said to himself. Jerry and Judy caught their dog, pushed him into the tub, and covered him with soap suds. Hobo did not like the soap and water at all. He jumped from the tub and ran out of the bathroom. He raced down the hall. The kids were close behind. Hobo dashed through the bedrooms. He left a trail of soap suds everywhere. What a mess!

Finally, Jerry and Judy trapped Hobo under the kitchen table. Each grabbed a front leg and they dragged their frightened, wet dog outside. While Jerry and Judy were busy cleaning up the mess, their dog was digging in the yard. Hobo was soon a happy, dirty dog once again.

Munk the Chipmunk

Munk the Chipmunk was walking through the forest. He felt as though somebody were watching him, somebody he didn't like at all. The good-looking chipmunk began to run quietly along the path. Four blue eyes watched Munk run. The eyes belonged to two mean cats. The large cat was hiding low in the leaves. Only his tail moved. The small cat was lying low in the tall grass nearby. Side by side, they slowly began to creep toward poor Munk. Munk was getting more and more nervous. Something just was not right.

About that time Munk heard a sound in the dry leaves behind him. Just as the larger cat was about to jump on him, Munk turned quickly. He ran a few steps and hid under some dry leaves. Munk thought he was safe, but the smaller cat was soon sneaking through the leaves toward Munk's hiding place. Munk jumped up and ran as fast as he could toward a small creek, with the two cats close behind him. The tiny chipmunk jumped right into the cold water. He swam rapidly to the other side. "Where can I hide?" he cried. Then he spotted a mouse hole a few feet away. Munk disappeared safely into the tiny mouse hole just as the two cats leaped across the creek.

A Shiny Blue Bike

Every day Linda would sweep the sidewalk in front of Mr. Fisher's grocery store. She saved all the money that Mr. Fisher paid her. Linda planned to buy a shiny blue bicycle she had seen in the window of Meredith's Department Store.

"One day soon I will have enough money to buy that beautiful bike," Linda told her friends. And when that day came, Linda took the money Mr. Fisher paid her and rushed to Meredith's Department Store. "I want to buy that shiny blue bike in the window," she told the salesman.

"I'm sorry, little girl," the man replied. "Someone has already taken that bike."

"They couldn't do that!" exclaimed Linda. But the man was right. The shiny blue bike was gone.

Linda walked slowly home. She pushed her hands deep into her pockets. When she walked silently into the house, her mother knew something was wrong. "What's the matter, Linda?" she asked.

"Someone else bought my bicycle," the girl replied gloomily. "I wanted it so much."

Then Linda turned around and noticed her father. He had a big smile on his face. Next to him stood the shiny blue bike from the department store. "I bought it for you," he told Linda. "I was afraid someone else would get it first."

The Hat

One dark, rainy day last Spring, Bob and his sister Debby could find nothing to do. "I know what would be fun. Let's go up into the attic and see all the old things there," Bob suggested.

So Debby and Bob climbed the stairs to the dark and dusty attic of their parents' house. "Look over here," cried Debby. She showed Bob some old-time clothes she had found. "These must have belonged to Grandmother." Debby began trying on the old dresses, shoes and hats.

Meanwhile, Bob was playing with an old record player he had discovered. Suddenly Debby screamed loudly, "That hat moved!" She pointed to the big flower-covered hat sitting on the floor.

"Oh, you silly girl," Bob said. "That hat couldn't move." He went over to pick it up. As he reached for it, the hat slid quickly across the floor. Bob dashed down the stairs, screaming all the way. Debby was close behind. When their mother saw them, they were white as sheets. "What's wrong with you two?" she asked.

"There's a hat in the attic that moves by itself," Debby told her mother with excitement. "Come and see." When they reached the attic, their mother went over and started to pick up the hat. The hat flipped over and there sat Debby's cat Fluffy.

Inkspot

Tommy was afraid. His new neighbor, Mrs. Cohen, had threatened to call the dogcatcher if she ever saw Tommy's dog Inkspot in her yard again. "But Inkspot's a good dog," Tommy said to himself. "He wouldn't bite anyone, especially not Mrs. Cohen's little daughter."

Tommy warned Inkspot to stay in his own yard. He wasn't sure his dog could understand. "What would I do if they took you away?" Tommy asked his dog.

One day while Tommy was at school, Inkspot was busy burying bones in his yard. Suddenly the dog heard screams coming from the small lake behind Mrs. Cohen's house. Inkspot dashed to the lake. Mrs. Cohen's little daughter had fallen in and was crying for help. Inkspot jumped into the cold water and seized the girl's dress in his teeth. He pulled her to shore and gently dragged her out of the water. Just then, Mrs. Cohen came running. "Get away from my child, you nasty old dog," she barked at Inkspot. "I'm going to call the dogcatcher. You won't be able to bother my daughter anymore."

"But he's a nice doggy," the little girl said. "He saved me when I fell into the water."

Mrs. Cohen was surprised. She patted Inkspot and said, "I guess you're not such a bad dog after all."

Meek, the Homeless Field Mouse

Meek was a very small, shy field mouse. All summer he had stayed far away from the red brick house where the big people lived. Then one cold fall day, Meek decided to find a warm home for the winter. Carefully he approached the huge room that smelled of gasoline, people, grass cuttings and many other things. Meek moved slowly to the back of the room. He stayed close to the wall. He stopped for a moment to look at some gardening tools. They smelled like plants and earth. In a dark corner near the tools, Meek discovered two large shoes. The shoes were old and covered with dirt. "A fine home," Meek said to himself. He was quite tired. The little mouse climbed into a shoe, curled up in its toe and went to sleep.

Meek awoke suddenly when the shoe was moved. He opened his eyes and saw five toes coming at him. The big toe punched him in the face. When the huge foot left the shoe, Meek peered out and saw a big woman glaring at him. The woman screamed and Meek screamed. Meek leaped from the shoe. He ran until the woman with the huge foot was far, far away.

SAMMY SQUIRREL

Sammy Squirrel was sitting on a large branch above a little creek. Sammy was busy cleaning the long hairs on his tail. "See what a handsome squirrel I am," he said over and over. "I have a handsome tail."

The day before a young squirrel had moved into the tree which was near Sammy's tree. Sammy insisted on showing the newcomer the forest. Sammy led the way through the trees, making leaps from branch to branch. The newcomer watched Sammy use his tail to fly through the air and to keep his balance on the thin branches. Sammy's leaps grew longer and more dangerous. Soon all the other animals in the valley had gathered to watch Sammy's show. Once Sammy knew everyone was watching him, he went faster and faster, higher and higher. He flew through the air above the creek with his tail bushed out behind. He reached for the end of a small branch. Sammy twisted and turned trying to find another branch as he fell toward the creek. He fell into the creek with a large splash. When he crawled out of the creek, his tail was thin, wet and dirty. All the animals in the forest laughed at Sammy, the show-off squirrel.

Fright in the Night

Jinx and Sam set up their tent on a flat, grassy area not far from the edge of the lake. Jinx and Sam had never camped in the woods before. They noticed that no other people were camped nearby.

Because it was getting dark and they were very tired, Jinx and Sam decided to eat their dinner. They cooked the meal over a small wood fire. When they had finished eating, they stored their leftover food in their tent. Then they crawled into their sleeping bags and went to sleep.

In the middle of the night, something suddenly woke Jinx up. She sat up and looked all around. Then she heard the frightening sound again. Jinx grabbed Sam. "Wake up," she said. "There's something outside the tent!"

Sam and Jinx could both hear the heavy breathing of a large animal. A large brown bear was just outside the tent. He had smelled food and was looking for something to eat. The hungry bear pawed at the tent.

"Do something, Sam," Jinx cried. Sam bravely punched at the tent with all his strength. He hit the bear right on the nose. The big bear yelped with pain. He turned and ran off into the woods, leaving Jinx, Sam, and their food safe inside the tent.

The Big Game

It was the last inning of the championship baseball game. Brian's team was leading the West Side Tigers by three runs, 7 - 4. As Brian stood in center field, he was thinking of the big party his team would have after the game. He could almost see himself holding the big, shiny trophy.

Before long, the Tigers had a runner on each base. But there were two outs, so Brian felt sure his team would win. Then the Tiger's big slugger stepped up to bat. The Tiger's fans yelled, "Hit a homerun!" "Strike him out!" screamed the people cheering for Brian's team.

"I hope he hits it to me," Brian whispered to himself. "When I catch it, I'll be the hero." The pitcher threw the ball. Crack! The baseball jumped off the bat and sailed toward Brian. Brian ran slowly to where he thought the ball would come down. But just as he was ready to grab it, Brian stumbled and fell flat on his face. The ball rolled to the fence. All the Tigers raced around to home plate. Now the score was 8 - 7. Brian's team had lost. He stood up slowly and looked at all his sad teammates. "What will I say to them?" he asked himself.

Tigger

Tigger was an extremely proud cat. One day Tigger was wearing his new leather collar. He was pleased with the way he looked. The tip of his tail moved slowly from side to side as he walked. He was certain that all the forest animals were admiring his new collar. "Time to show everyone what a clever cat I am," he thought. First he pretended to hunt and catch a mouse. Then he ran quickly up a tree. As he started to leap to the ground he felt a tug at his collar. Tigger's new collar was caught on the branch. Tigger hung below the branch, high above the ground. He moved this way and that way, but could not free his collar from the tree. Tigger did not want to hang from that tree any longer. So he turned and twisted and chewed on his new collar. The collar finally broke and Tigger fell to the ground. He sat on the ground for a moment looking up at what was left of his new leather collar. "It wasn't a very good one anyway," he said to the forest animals who were watching him. Then he slowly walked away with his head held high.

A Wild Ride

For a long time Gary had wanted to drive his father's big red riding lawnmower. One day he decided to mow the lawn while his father was at work. Gary was sure it would make his father happy to find the grass cut when he came home. "He won't be angry that I used his mower," thought Gary, "even though he said I shouldn't."

Gary walked into the garage and climbed onto the big, powerful mower. He had no trouble starting it. He had watched his father do that many times. The big roaring machine burst from the garage with Gary sitting proudly in the seat. He began driving the mower in neat circles around the yard. "This is easy," Gary said to himself. The little boy pretended he was a race car driver, speeding around the racetrack.

Faster and faster he went. Suddenly, Gary lost control of the speeding mower. It raced wildly between two big trees and down a hill. "Help!" screamed Gary. The mower sped straight at Mr. Green's bee hive. Crash! All the angry bees swarmed from their smashed home and flew at Gary. He jumped from the mower and dashed across the yard. He ran into his house and slammed the door, just in time to escape the angry bees.

Willy the Woodchuck

Willy had a comfortable home for a woodchuck. He lived under a big red farmhouse. He shared the house with some bats who lived in the attic and some mice who lived in the kitchen. Willy always had plenty of food to eat. Farmers came every spring and planted corn in the field next to the house. This year the corn tasted especially good. Since Willy loved to eat, he ate corn all day long. During the first part of the summer, Willy stored lots of corn under the farmhouse. He spent the rest of the summer in a large hole at the end of the field.

When the cold weather came, Willy left the field. He moved slowly toward his warm home under the old farmhouse. As he began to crawl through the hole in the wall he noticed something was wrong. Willy had eaten too much corn and the hole was now too small. He tried to push himself through the small hole. Suddenly he realized he was stuck! Then he heard little sounds from behind him. There stood the mice, laughing at him. "Please help me," cried Willy. The mice stopped laughing and started chewing on the wood wall. Soon Willy crawled into his home. He gathered up a sackful of corn and gave it to the mice as a reward.

APPENDIX H

The Instructions

Instructions for Generating Questions

You will have three minutes to read and study the story you have been given. Imagine that you are reading the story to a ten-year-old pupil whose achievement level is three years behind the chronological age. Using the story as a point of departure, write inferring and problem solving questions which such a child could answer. Avoid asking questions which may be answered "yes" or "no." Such questions usually begin with the words "Could you," "Would you," "Can you tell me," "Do you know," or "Do you remember." Please avoid wording your questions so that they may be answered "yes" or "no." You will be allowed 8 minutes in which to generate as many inferring and problem solving questions as possible. The questions need not be directly related to the story.

Instructions

Anticipating Videotapes

Six segments of teacher-pupil interaction will be shown on the television screen before you. Each segment has two parts. The questions and responses in one part are based on the story "Munk, the Chipmunk" and in the other on "Hobo, a Dirty Dog." The teacher read the story to the pupil immediately before the videotaping. Time will be provided for you to read the stories before viewing the taped interaction.

All parts begin with two teacher questions and pupil responses which you should observe carefully. Following the two introductory questions and responses, the number 1 (one) is visible for approximately ten seconds. During this pause, read in the Anticipation Booklet the three choices and select the question you think the teacher will ask next. Record your prediction in the Coding Booklet. Upon each number's first appearance, anticipate the teacher's question by selecting one of the alternatives. On that number's second appearance, read the pupil responses in the Anticipation Booklet and record the one you predict the child will give.

When the phrase "Code Only" appears instead of a number, no anticipation is made. The dialogue which follows will appear on the blue card in your Anticipation Booklet. When "Antic Only" appears, go to the next card and continue anticipating as before.

To clarify the anticipating procedure, a practice segment is provided. Be sure you have six Anticipation Booklets, one Coding Booklet, and two stories. You will have four minutes to read "Hobo, a Dirty Dog." You should then anticipate the practice segment. Be sure to provide the information requested at the top of each coding sheet as the corresponding part begins. If you still have questions after the practice segment, you may ask them before Segment 1 begins.

Instructions

Anticipating Written Materials

Each of the six Anticipation Booklets before you consists of a segment of teacher-pupil interaction. Each segment represents the dialogue of a different teacher and pupil. The segments are composed of two parts. The questions and responses are based on the stories "Munk, the Chipmunk," and "Hobo, a Dirty Dog," which the teacher read to the pupil previous to the discussion. Take time to read the appropriate story before each part.

All parts begin with two teacher questions and pupil responses which should be carefully read. The next card presents three teacher questions. Select the question you think the teacher will ask next. Record your prediction in the Coding Booklet. Then turn to the next card and read which question the teacher actually asked. On this card you will also find the pupil response alternatives. Record your anticipation before turning to the next card to read which response the pupil gave.

Besides the introductory dialogue, there are other teacher questions and pupil responses which are not to be anticipated. Both these interactions and the introductory dialogues will appear on cream-colored cards in your Anticipation Booklet.

To clarify the anticipating procedure, a practice segment is provided. Be sure you have six Anticipation Booklets, one Coding Booklet, and two stories. You will have four minutes to read "Hobo, a Dirty Dog." You should then anticipate the practice segment. Be sure to provide the information requested at the top of each coding sheet. If you still have questions after the practice segment, you may ask them before Segment 1 begins.

Instructions

Coding Videotapes

Six segments of teacher-pupil interaction will be shown on the television screen before you. Each segment has two parts. The questions and responses in one part are based on the story "Munk, the Chipmunk," and in the other on "Hobo, a Dirty Dog." The teacher read the story to the pupil immediately before the videotaping. Time will be provided for you to read the stories before viewing the taped interaction.

All parts begin with two teacher questions and pupil responses which you should observe carefully. Following the two introductory questions and responses, the number 1 (one) is visible. A number's first appearance indicates which teacher question will be presented. The number's second appearance indicates which pupil response will be presented. Code teacher questions and pupil responses according to the categories Re, In, PS, A, Ia, and NR. Record your coding in the Coding Booklet.

When the phrase "Code Only" appears, code the pupil response you have just viewed. Do not code the teacher-pupil interaction which follows. On the next appearance of a number (not "Antic Only") you should code the next teacher question and continue as before.

After coding each part, compare your coding to that given in the Criterion Booklet.

To clarify the coding procedure, a practice segment is provided. Be sure you have one Coding Booklet, one Criterion Booklet, and two stories. You will have four minutes to read "Hobo, a Dirty Dog." You should then code the practice segment. Please provide the information requested at the top of each coding sheet as the corresponding part begins. If you still have questions after the practice segment, you may ask them before Segment 1 begins.

Instructions

Coding Written Materials

The Transcript before you consists of six segments of teacher-pupil interaction. Each segment represents the dialogue of a different teacher and pupil. The segments are composed of two parts. The questions and responses in one part are based on the story "Munk, the Chipmunk" and in the other part on "Hobo, a Dirty Dog." The teacher read the story to the pupil immediately before their discussion of it. Take time to read the appropriate story before beginning to code each part.

All parts begin with two introductory questions and pupil responses which should be read carefully. These introductory interactions and other questions and responses which have not been numbered are in script type. Do not code any interaction which has been typed in script. Code all other teacher questions and pupil responses according to the categories Re, In, PS, A, Ia, and NR as defined in the Training Manual. Record your coding of the Transcript in the Coding Booklet. Please provide the information requested at the top of each coding sheet.

After finishing each part, compare your coding to that given in the Criterion Booklet.

To clarify the coding procedure, a practice segment is provided at the beginning. Be sure you have one Transcript, one Coding Booklet, one Criterion Booklet, and two stories. You will have four minutes to read "Hobo, a Dirty Dog." Then you should code the practice segment. If you still have questions after the practice segment, you may ask them before Segment 1 begins.

Criterion Teaching Task Directions

Today you will be working with a pupil who is between the ages of nine and twelve and whose achievement level may be two or more years behind the chronological age. You will be reading a short story to the pupil and then asking the pupil questions suggested to you by the story or by the pupil's replies.

Your task is to teach the child:

1. To infer (i.e., to arrive at his own conclusions, hypotheses, or interpretations).
2. To solve problems (i.e., to analyze situations and suggest solutions).

Your questions should be worded so that the pupil is able to respond appropriately. An appropriate response is one which provides relevant information, is potentially correct, and contains sufficient information. The objective is to elicit as many appropriate responses from the pupil to inferring and problem solving questions as possible.

A "yes" or "no" response is not coded as an appropriate response in the scoring system. Avoid asking questions which may be answered "yes" or "no." Such questions usually begin with the words "Could you," "Would you," "Can you tell me," "Do you know," or "Do you remember." Please avoid wording your questions so that they may be answered either "yes" or "no."

The time sequence is as follows:

1. Approximately 6 minutes to read the story and to note possible questions on the story sheet.
2. Approximately 5 minutes to become acquainted with the pupil.
3. A few minutes to read the story to the pupil.

4. Exactly 8 minutes for your questions and the pupil's responses.

In review, this is your task:

1. Ask inferring and problem solving questions.
2. Elicit as many appropriate responses from the pupil as you can.
3. Avoid asking "yes/no" type questions. "Yes/no" responses are not scored as appropriate.

APPENDIX I

Forms

Evaluation of Activities and Materials

Instructions: Circle the appropriate answer or provide an answer where no choices are given.

1. What do you think were the objectives of this week's activities?

2. Which type of instruction was more helpful: written or verbal?

3. Which procedures or instructions were not clear?

4. Were the examples used in the manual realistic and helpful? Yes No
Comments:

What was the purpose of the training manual?

5. Evaluate the following items as A, B, C, D, or E: A = excellent and E = very poor.

Groups I and II only (Videotapes)

	Scale	Comments
Picture quality	A B C D E	
Sound quality	A B C D E	
Amount of feedback	A B C D E	
Ability to hold interest	A B C D E	
Realism	A B C D E	
Pace	A B C D E	

Groups III and IV only (Written Materials)

	Scale	Comments
Appearance	A B C D E	
Realism	A B C D E	
Amount of feedback	A B C D E	
Ability to hold interest	A B C D E	

6. Did you feel that the task was:
Anticipating (Groups I & III)

too difficult appropriate too easy

Coding (Groups II & IV)

too difficult appropriate too easy

7. For the child, were the stories:

Exciting	Interesting	OK	Boring	Absurd

8. For the child, were the stories:

Too difficult	Appropriate	Too easy

9. Over the week, the amount of practice exercises was:

Excessive	Appropriate	Insufficient

10. Did you feel that the week's activities were well organized? Yes No

11. Which activities do you expect to find most useful as a teacher?

    Manual
    Coding or Anticipating
    Generating questions (paper and pencil)
    Interaction with child

12. How relevant do you think this week's activities have been to your training as a special education teacher?

A	B	C	D	E
very relevant				not relevant

Comments:

13. How readily will you be able to apply this experience in an actual classroom situation?

A	B	C	D	E
very easily				cannot apply

Comments:

14. What did you like most about this week's activities?

15. What did you like least?

Other comments:

Information on Teacher Trainees

Please provide the following information:

Name ____

Campus Address __________________________________

Campus Phone ______________

Class Standing ______________ Age ________

Major Area of Study ______________________________

Teaching Experience: Years ____________________________

Type of class ____________________________

Grade level ____________________________

APPENDIX J

Overview of Training

Overview

This week's activities will focus on effective questioning of pupils during instruction. Considerable evidence has been gathered which indicates that teachers use questions as one of their primary instructional techniques. There is also evidence that teachers lack skill in wording different kinds of questions so that their pupils are able to understand and answer the questions.

Thus, the purpose of this week's activities is to increase your ability to ask different types of questions and your skill in eliciting appropriate responses from pupils. The purpose is also to test the effectiveness of the different training materials.

Please do not discuss the activities or materials with each other or with your friends until next week. This is essential if anything is to be learned about the usefulness of the materials.

We also ask that you be prompt in your attendance of all sessions. If you feel that you cannot make such a commitment, please speak up now. If some unforeseen emergency should keep you from attending a session, please notify the Special Education office as soon as possible.

We very much appreciate your cooperation and hope that you find the activities enjoyable and useful.

Overview for Group V

This week's activities will focus on effective questioning of pupils during instruction. Considerable evidence has been gathered which indicates that teachers use questions as one of their primary instructional techniques.

Thus, the purpose of your participation is to provide us with more detailed information about teacher trainees' questioning behaviors. Also, these activities provide you with further experience in asking questions.

In a moment, you will be signing up for a time on Thursday or Friday during which you will be asking a pupil questions in a specific teaching situation. No preparation is needed. Some of your classmates will be attending other activities on other days. Please do not discuss the activities with each other or with your friends until next week. This is essential if anything is to be learned from these activities.

We also ask that you be prompt in your attendance. If you feel that you cannot make such a commitment, please speak up now. If some unforeseen emergency should keep you from attending at your assigned time, please notify the Special Education office as soon as possible.

We very much appreciate your cooperation and hope that you find the activities enjoyable and useful.